AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
N/A	1 | 2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
0005	13 AUGUST 1999		

6. ISSUED BY	CODE	7. ADMINISTERED BY *(If other than Item 6)*	CODE
LOS ANGELES DISTRICT, COE CESPL-CT-P (S. OLIVER-HALL) P.O. BOX 532711 LOS ANGELES, CA 90053-2325			

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP code)*	(X)	9A. AMENDMENT OF SOLICITATION NO.
		DACA09-99-B-0014
	X	9B. DATED *(SEE ITEM 11)* 24 AUG 99 (BID OPENING)
		10A. MODIFICATION OF CONTRACT/ORDER NO. N/A
		10B. DATED *(SEE ITEM 13)* N/A
CODE / FACILITY CODE		

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☒ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(X)	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation date, etc.)* SET FORTH IN ITEM 14, PURSUANT TO AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER *(Specify type of modification and authority)*

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

LUKE AIR FORCE BASE AIR TRAFFIC CONTROL TOWER, MARICOPA COUNTY, ARIZONA

** THE BID OPENING DATE IS HEREBY CHANGED FROM AUGUST 17, 1999 TO AUGUST 24, 1999.

--- CONTINUED ON PAGE 2 OF 2 ---

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
15B. CONTRACTOR/OFFEROR _____ *(Signature of person authorized to sign)*	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY _____ *(Signature of Contracting Officer)*	16C. DATE SIGNED

Standard Form 30
Item 14. Continued.

a. Drawings

The drawings listed below shall be voided and the accompanying revised drawings of the same number, each bearing revisions dated 10 August 1999, shall be substituted therefor:

No.	DESCRIPTION
A-31	EXTERIOR DETAILS
S-1	STRUCTURAL GENERAL NOTES & QUALITY CONTROL
S-4	LEVELS TWO AND THREE FLOOR FRAMING PLANS
S-5	LEVELS FOUR AND FIVE FLOOR FRAMING PLANS
S-6	LEVELS SIX AND SEVEN FLOOR FRAMING PLANS

b. Specifications

Revised sections have deletions and additions indicated by [AM#5] and by underlined text. The sections listed below shall be voided and the accompanying revised sections of the same title and number, each bearing the notation "THIS SECTION MODIFIED BY AMENDMENT 0005" shall be substituted therefor:

01000 GENERAL REQUIREMENTS
14210 ELEVATORS, ELECTRIC

c. Specifications

The sections listed below and the accompanying new sections of the same title and number, each bearing the notation "THIS SECTION ISSUED BY AMENDMENT 0005" shall be added:

01415 METRIC MEASUREMENTS

d. Specifications

Following Section 02466 DRILLED FOUNDATION CAISSONS (PIERS) add the accompanying FOUNDATION DESIGN REPORT dated November 1998.

-- End of Document --

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DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01000

GENERAL REQUIREMENTS

-- End of Section Table of Contents --

SECTION 01000

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 Site Plan

The Contractor shall prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area and details of the fence installation. Any areas which may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate if the use of a supplemental or other staging area is desired.

1.1.2 Identification of Employees

The Contractor shall be responsible for furnishing to each employee, and for requiring each employee engaged on the work to display, identification as approved and directed by the Contracting Officer. Prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon release of any employee. When required, the Contractor shall obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works.

1.1.3 Employee Parking

Contractor employees shall park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking shall not interfere with existing and established parking requirements of the military installation.

1.2 SCRAP MATERIAL

Materials specified to be removed and become the property of the Contractor are designated as scrap, and the Contractor, by signing this contract, hereby acknowledges that he has made due allowance for value, if any, of such scrap in the contract price.

1.3 WRITTEN GUARANTEES AND GRANTOR'S LOCAL REPRESENTATIVE

Prior to completion of the contract, the Contractor shall obtain and furnish to the Contracting Officer's representative written guarantees for all the equipment and/or appliances furnished under the contract. The Contractor shall furnish with each guarantee: The name, address, and telephone number of the guarantor's representative nearest to the location where the equipment and/or appliances are installed, who, upon request of the using service's representative, will honor the guarantee during the

guaranty period and will provide the services prescribed by the terms of the guarantee.

1.4 PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT FURNISHED CONTRACTOR-INSTALLED PROPERTY

The Contractor shall promptly furnish and shall cause any subcontractor or supplier to furnish, in like manner, unit prices and descriptive data required by the Government for Property Record purposes of fixtures and equipment furnished and installed by the Contractor or subcontractor, except prices do not need to be provided for Government-Furnished Property. This information shall be listed on Resident Management System forms furnished by the Government.

1.5 TEMPORARY ELECTRIC WIRING

1.5.1 Temporary Power and Lighting

The Contractor shall provide construction power facilities in accordance with the safety requirements of the National Electrical code NFPA No. 70 and the SAFETY AND HEALTH REQUIREMENTS MANUAL EM 385-1-1. The Contractor, or his delegated subcontractor, shall enforce all the safety requirements of electrical extensions for the work of all subcontractors. All work shall be accomplished by skilled electrical tradesmen in a workmanlike manner, approved by the Contracting Officer.

1.5.2 Construction Equipment

In addition to the requirements of EM 385-1-1, SAFETY AND HEALTH REQUIREMENTS MANUAL, all temporary wiring conductors installed for operation of construction tools and equipment, shall be either Type TW or TXW contained in metal raceways, or may be multiconductor cord. Temporary wiring shall be scoured above the ground or floor in a workmanlike manner and shall not present an obstacle to persons or equipment. Open wiring may only be used outside of buildings, and then only in strict accordance with the provisions of the National Electrical Code.

1.6 UTILITIES NOT SHOWN

If the Contractor encounters, within the construction limits of the entire project, utilities not shown on the plans and not visible as to the date of this contract and such utilities will interfere with construction operations, he shall immediately notify the Contracting Officer in writing to enable determination by the Contracting Officer as to the necessity for removal or relocation. If such utilities are removed or relocated as directed by the Contracting officer, the Contractor shall be entitled to equitable adjustment for any additional pertinent work or delay.

1.7 GENERAL SAFETY REQUIREMENTS

1.7.1 General

The Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, and the Occupational Safety and Health Act (OSHA) Standards for Construction (Title 29, Code of Federal Regulations Part 1926 as revised from time to time); General Industry Standards (Title 29, Code of Federal Regulations Part 1910 as revised from time to time); and the National Fire Protection Association Codes are applicable to this contract. In case of conflict the most stringent requirement of the standards is applicable.

1.7.2 The Prime Contractor's Superintendent

The prime Contractor's superintendent shall take an active role in enforcing the safety requirements by participation in safety conferences, hazard analysis (see below), tool box meetings, walk-through inspections, correction of violations, etc., and including that of the subcontractors work.

1.7.3 Job Hazard Analysis

Based on the construction schedule, the Contractor shall submit a job hazard analysis of each major phase of work prior to entering that phase of activity. The analysis shall include major or high risk hazards, as well as commonly recurring deficiencies that might possibly be encountered for that operation, and shall identify proposed methods and techniques of accomplishing each phase in a safe manner. The Prime Contractor's superintendent shall take active participation in the Job Hazard Analysis, including the subcontractors' work. Prior to start of actual work a meeting shall be held with Prime Contractor, Government, and affected subcontractor to review the Job Hazard Analysis. In addition, job site meetings shall be held to indoctrinate foreman and workers on details of this analysis.

1.7.4 Violations

If recurring violations and/or gross violation indicate that the safety performance is unsatisfactory, corrective action shall be taken as directed,and at the discretion of the Contracting Officer's Representative. The retention or some part thereof will be withheld from the progress payment until corrective action has been completed.

1.7.5 Elevated Work Areas

Workers in elevated work areas in excess of 6 feet above an adjoining surface require special safety attention. In addition to the provisions of EM 385-l-l, the following safety measures are required to be submitted to the Contracting Officer's Representative prior to commencement of work in elevated work areas. The Contractor shall submit drawings depicting all provisions of his positive protection system including, but not limited to, all details of guard rails.

(a) Positive protection for workmen engaged in the installation of structural steel and steel joists shall be provided by safety nets, tie-off's, hydraulic man lifts, scaffolds, or other required means. Decking crews must be tied-off or work over nets or platforms not over 6 feet below the work area. Walking on beams and/or girders and the climbing of columns is prohibited without positive protection.

(b) Perimeter guard rails shall be installed at floor, roof, or wall openings more than 6 feet above an adjoining surface and on roof perimeters. Rails shall be designed to protect all phases of elevated work including, but not limited to, roofing operations and installation of gutters and flashing. Rails around roofs may not be removed until all work on the roof is complete and all traffic on or across the roof ceases. Rails shall be designed by a licensed engineer to provide adequate stability under any anticipated impact loading. As a minimum, the rails shall consist of a top rail at a height of 42 inches, a mid rail and a toe board. Use of tie-offs, hydraulic man lifts, scaffolds, or other means of roof edge protection methods may be utilized on small

structures such as family housing, prefabricated metal buildings, etc.

1.7.6 Fire Protection

Twenty-four hours notice shall be given to the Contracting Officer for coordination with the Facility Fire Department prior to conducting any fire hazardous operation. Cutting or welding will be permitted only in areas that are or have been made fire safe. Where possible, all combustibles shall be located at least 35 feet horizontally from the work site. Where such location is impracticable, combustibles shall be protected with flame-proofed covers or otherwise shielded with metal or asbestos guards or curtains. Edges of covers at the floor shall be tight to prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile. Other fire prevention precautions shall be in accordance with the latest National Fire Codes.

1.7.7 Recordingkeeping/Reporting Requirements

On all contract operations, the Prime Contractor shall be responsible for recording and reporting all accident exposure and experience incident work. (This includes exposure and experience of the prime Contractor and his/her sub-contractor(s). As a minimum these records shall include exposure work-hours and a log of occupational injuries and illnesses. (OSHA Form 200 or state equivalent as prescribed by 29 CFR 1904.5) Reference EM 385-1-1, 02.A.02.

1.7.8 Accident Reporting

As part of the requirements for reporting accidents in accordance with EM 385-l-l, Section 2, the Prime Contractor will submit at the 50% point and 100% of project completion, a written summary of worker’s compensation claims filed by workers on the project. The report will include all subcontractors. The main report covering the Prime Contractor claims will be certified as "correct and true" by the Contractor’s compensation insurance carrier. The same certification will be required for subcontractor reports.

1.8 PUBLIC CONVENIENCE AND SAFETY

The Contractor shall conduct his operations so as to offer the least possible obstruction and inconvenience to public traffic, and all traffic shall be permitted to pass through work with as little delay as possible. Where the nature of construction operations in progress and the equipment and machinery in use are of such character as to endanger passing traffic, the Contractor shall provide such lights and signs, erect such fence or barriers, and station such guards as may be necessary to give adequate warning and to avoid damage or injury to passing traffic. Signs, flags, lights, and other warning and safety devices shall conform to applicable city, county, and state requirements.

1.9 EXCAVATION PERMITS

All excavation permits will be issued to the Contractor from the Base Civil Engineer (BCE) through the Contracting Officer. The appropriate form, for this request, may be obtained from the Contracting Officer. Processing time required by the BCE is 14 calendar days. Questions concerning the excavation permit should be directed to the Contracting Officer.

1.10 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

1. This provision specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE, Section 00700, entitled "DEFAULT (FIXED-PRICE CONSTRUCTION)". In order for the Contracting Offices to award a time extension under this clause, the following conditions must be satisfied.

   (a) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

   (b) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

2. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON (5) DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
(09)	(05)	(03)	(01)	(00)	(00)	(02)	(02)	(01)	(02)	(03)	(07)

3. Upon acknowledgement of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. (ER 415-1-15, 31 OCT 89)

1.11 HOUSEKEEPING AND CLEANUP

Pursuant to the requirements of paragraph, CLEANING UP and paragraph, ACCIDENT PREVENTION, Of the CONTRACT CLAUSES, Section 00700, the Contractor shall assign sufficient personnel to insure strict compliance. The Contractor shall submit a detailed written plan for implementation of this requirement. The plan will be presented as part of the preconstruction safety plan and will provide for keeping the total construction site, structures and accessways free of debris and obstructions at all times. Work will not be allowed in those areas that, in the opinion of the Contracting Officer's representative, have unsatisfactory cleanup and housekeeping at the end of the preceding day's normal work shift. At least once each day all areas shall be checked by the Quality Control person of the Prime Contractor and the findings recorded on the Quality Control Daily Report, In addition, the Quality Control person will take immediate action to insure compliance with this requirement. Housekeeping and cleanup shall be assigned by the Contractor to specific personnel. The name(s) of the personnel shall be available at the project site; each person will be supplied with a distinctively marked hard hat, to be worn from the beginning to the end of the project.

1.12 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

1. Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a Contractor or subcontractor at any tier shall be based on actual cost data when the Government can determine both ownership and operating costs for each piece of equipment or equipment groups of similar serial and series from the Contractor's accounting records. When both ownership and operating costs cannot be determined from the Contractor's accounting records, equipment costs shall be based upon the applicable provisions of EP 1110-1-8, "Construction Equipment Ownership and Operating Expense Schedule, Region VII. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the Contracting Officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retrospective pricing, the schedule in effect at the time the work was performed shall apply.

2. Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36 substantiated by certified copies of paid invoices. Rates for equipment rented from an organization under common control, lease-purchase or sale-leaseback arrangements will be determined using the schedule except that rental costs leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated leases are allowable. Costs for major repairs or overhaul are unallowable.

3. When actual equipment costs are proposed and the total amount of the pricing action is over $25,000, cost or pricing data shall be submitted on Standard Form 1411, "Contract Pricing Proposal Cover Sheet". By submitting cost or pricing data, the Contractor grants to the Contracting Officer or an authorizing representative the right to examine those books, records, documents and other supporting data that will permit evaluation of the proposed equipment costs. After price agreement, the Contractor shall certify that the equipment costs or pricing data submitted are accurate, complete and current.

1.13 SPECIAL CONSTRUCTION RESTRAINTS/REQUIREMENTS

1. Existing facilities shall be protected from damage throughout the course of the contract. Protection measures shall be as described herein, as indicated on drawings, and as may otherwise be required to protect the existing facilities. If the existing facilities are damaged in any way, the Contractor shall be responsible for restoring the damaged area to a like-new condition and to the satisfaction of the Contracting Officer.

2. The Contractor shall protect existing utilities and maintain adequate drainage of the Contractor's lay-down area.

   a. [AM#5] The contractor area encompassed by FOD barrier, as indicated on Sheets C-6 and C-7, may be increased 12 meters westward adding an area 12 meters by 26.5 meters during any job site forming of structural concrete panels.

3. Utility Services:

   (a) The Contractor shall submit a request to interrupt any such

services to the Contracting Officer, in writing, fourteen (14) days in advance of proposed interruption. The request shall state reason, date, exact time of, and approximate duration of such an interruption. Interruptions in utility services shall be of the shortest possible duration for the work at hand. Any outage shall not exceed 2 hours, unless previously approved by the Contracting Officer. Outages shall occur during the weekends.

(b) The Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of the Base.

4. Normal working hours shall be between the hours of 0600-1700, Monday thru Friday. No work shall be conducted on weekends or Federal/Military holidays.

5. Coordination of Trades: The Contractor is responsible for planning the proper installation of all equipment within the required spaces and work areas. The Contractor shall conduct an inspection of all work areas and will coordinate with his various trades to ensure that proper installation is achieved. Failure to perform proper planning which results in delays or increases the cost shall be the responsibility of the Contractor.

6. Use or travel of vehicle or heavy equipment on location outside the project limits shown on the drawings is prohibited.

1.14 SOIL DENSITY TEST (USING METERS CONTAINING RADIOACTIVE MATERIALS)

Nuclear methods are not acceptable for soil and soil-aggregate density tests required by this contract except as stated in DIVISION 2. Testing for official results shall be conducted as specified in DIVISION 2 of this contract. If the Contractor proposes to use meters containing radioactive materials to obtain unofficial results for his own convenience, the Contractor shall adhere to the following requirements:

1. USAF Radioactive Material Permit shall be obtained prior to work being performed.

2. The Contractor shall contact the installation Radiation Protection Officer (RPO) at least 45 days prior to intended usage so adequate time is provided for processing the paperwork and obtaining the USAF Radioactive Material Permit.

3. The Contractor shall notify the RPO before bringing the radioactive material onto the installation and must notify the RPO when radioactive material is removed. The Contractor shall ensure that the RPO, installation fire department, and safety office know the locations where the material will be stored and used.

4. The Contractor shall comply with the requirements of his/her NRC or Agreement State license and the USAF Radioactive Material Permit.

5. The Installation RPO will periodically check the use of the radioactive material to ensure proper radiological health precautions are being followed. If the RPO discovers improper radiological procedures, the RPO will immediately notify the contract monitor to initiate corrective actions.

6. Applications for USAF Radioactive Material Permits are submitted as follows:

(a) All applications for permits shall be submitted to host base RPO for review and approval of qualified users to work on Air Force installations.

(b) Requests will be submitted in duplicate to RPO and will include:

(1) Evidence of a valid Nuclear Regulatory Commission (NRC) or Agreement State Radioactive Material License.

(2) A copy of an NRC Form 241, or a similar document (such as a letter), listing the specific licensable items the Contractor wishes to use on the base (in the case of an Agreement State licensee, the original must be forwarded by the Contractor to the appropriate NRC region).

(3) Proof of a valid Air Force contract.

(c) Non-Air Force organizations which possess Agreement State licenses must forward an NRC Form 241 directly to the applicable NRC regional office as well as to the committee (Reference Title 10, Code of Federal Regulations, Part 150.20). Agreement State licenses are valid for only 180 calendar days per calendar year. If the non-Air Force organization that possesses the Agreement State license wishes to conduct operations on the Air Force installation for more than 180 days per year, it must apply for and be issued an NRC license before a permit may be issued.

7. Renewal or termination of a USAF Radioactive Material Permit is processed as follows:

(a) Non-Air Force Organizations must formally apply for either a renewal or termination of their permit upon its expiration. Permits do not automatically terminate upon reaching their expiration date but remain active pending final disposition of the radioactive material.

(b) If the original contract is renewed or continued, then an application for renewal must contain the same information as the initial request.

(c) If work under the contract has been completed, the non-Air Force organization shall submit a formal application to terminate the permit. This application shall include appropriate disposal documents and radiation survey data to confirm that the radioactive materials have been removed from the installation. (AFR 161-16)

1.15 DISPOSAL OF MATERIAL

All excess material, waste, and unsuitable material shall be removed from Government property.

1.16 CONTRACTOR-SAFETY PERSONNEL REQUIREMENTS (1985 JAN HQ USACE)

1. Full-time, on-site, safety coverage by Contractors shall be required for the life of the contract.

2. The following conditions shall be met:

(a) The Contractor shall employ, to cover all hours of work at the project site(s), at least one safety and health person to manage the Contractor's safety program; duties which are not germane to the safety program shall not be assigned to this person(s) except as follows. The principal safety and health person shall report to and work directly to the Contractor's top on-site manager, corporate safety office, or other high-level official of equivalent position. The safety and health person(s) shall have the authority to take immediate steps to correct unsafe or unhealthful conditions. The employment of a safety and health person(s) shall not abrogate the safety and health responsibilities of other personnel. (Note: The superintendent may be the safety and health person if all of the qualifications are met.)

(b) Qualifications for Safety and Health Person(s)

(1) Safety and Health Person(s) shall have a degree in engineering or safety in at least a four year program from an accredited school and shall have been engaged in safety and occupational health for at least one (1) year of experience (no time being credited to this one (l) year unless at least fifty (5O) percent of the time was devoted to safety and occupational health) and shall have at least one (1) year experience in construction, or--

(2) Safety and Health Person(s) shall have legal registration as a Professional Engineer or a Certified Safety Professional and shall have been engaged in safety and occupational health for at least one (1) year of experience (no time being credited to this one (1) year unless at least fifty (50) percent of the time was devoted to safety and occupational health) and shall have at least one (1) year experience in construction, or--

(3) Safety and Health Person(s) shall trade a degree other than that specified in (a) above, and shall have been engaged in safety and occupational health for at least three (3) years of experience (no time being credited to these three (3) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health) and shall have at least two (2) years experience in construction, or--

(4) In lieu of a degree, Safety and Health person(s) shall have been engaged in safety and occupational health for at least five (5) years of experience (no time being credited to these five (5) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health) and shall have at least two (2) years experience in construction. The individual must also be a Certified Safety Professional.

(5) First aid work is not a creditable experience.

(c) The name and qualifications of the nominated safety and health person(s) shall be furnished to the Contracting Officer for acceptability and a functional description of duties shall be provided

prior to the pre-work conference. (52.2/9303)

NOTE: The Contractor shall have one or more Safety and Health Persons, each of whom meets the qualifications of 1.19.2(b) Qualifications for Safety and Health Person(s), physically present on the actual site of the work whenever work of any sort is being performed by a Contractor, subcontractor, or supplier personnel on the work site. The foregoing clause language shall not be interpreted to contravene this note.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01415

METRIC MEASUREMENTS

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SECTION 01415

METRIC MEASUREMENTS

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 380	(1993) Practice for Use of the International System of Units (SI)
ASTM E 621	(1994) Practice for Use of Metric (SI) Units in Building Design and Construction

1.2 GENERAL

This project includes metric units of measurements. The metric units used are the International System of Units (SI) developed and maintained by the General Conference on Weights and Measures (CGPM); the name International System of Units and the international abbreviation SI were adopted by the 11th CGPM in 1960. A number of circumstances require that both metric SI units and English inch-pound (I-P) units be included in a section of the specifications. When both metric and I-P measurements are included, the section may contain measurements for products that are manufactured to I-P dimensions and then expressed in mathematically converted metric value (soft metric) or, it may contain measurements for products that are manufactured to an industry recognized rounded metric (hard metric) dimensions but are allowed to be substituted by I-P products to comply with the law. Dual measurements are also included to indicate industry and/or Government standards, test values or other controlling factors, such as the code requirements where I-P values are needed for clarity or to trace back to the referenced standards, test values or codes.

1.3 USE OF MEASUREMENTS

Measurements shall be either in SI or I-P units as indicated, except for soft metric measurements or as otherwise authorized. When only SI or I-P measurements are specified for a product, the product shall be procured in the specified units (SI or I-P) unless otherwise authorized by the Contracting Officer. The Contractor shall be responsible for all associated labor and materials when authorized to substitute one system of units for another and for the final assembly and performance of the specified work and/or products.

1.3.1 Hard Metric

A hard metric measurement is indicated by an SI value with no expressed correlation to an I-P value, i.e., where an SI value is not an exact mathematical conversion of an I-P value, such as the use of 100 mm in lieu of 4 inches. Hard metric measurements are often used for field data such as distance from one point to another or distance above the floor.

Products are considered to be hard metric when they are manufactured to metric dimensions or have an industry recognized metric designation.

1.3.2 Soft Metric

a. A soft metric measurement is indicated by an SI value which is a mathematical conversion of the I-P value shown in parentheses (e.g. 38.1 mm (1-1/2 inches)). Soft metric measurements are used for measurements pertaining to products, test values, and other situations where the I-P units are the standard for manufacture, verification, or other controlling factor. The I-P value shall govern while the metric measurement is provided for information.

b. A soft metric measurement is also indicated for products that are manufactured in industry designated metric dimensions but are required by law to allow substitute I-P products. These measurements are indicated by a manufacturing hard metric product dimension followed by the substitute I-P equivalent value in parentheses (e.g., 190 x 190 x 390 mm (7-5/8 x 7-5/8 x 15-5/8 inches)).

1.3.3 Neutral

A neutral measurement is indicated by an identifier which has no expressed relation to either an SI or an I-P value (e.g., American Wire Gage (AWG) which indicates thickness but in itself is neither SI nor I-P).

1.4 COORDINATION

Discrepancies, such as mismatches or product unavailability, arising from use of both metric and non-metric measurements and discrepancies between the measurements in the specifications and the measurements in the drawings shall be brought to the attention of the Contracting Officer for resolution.

1.5 RELATIONSHIP TO SUBMITTALS

Submittals for Government approval or for information only shall cover the SI or I-P products actually being furnished for the project. The Contractor shall submit the required drawings and calculations in the same units used in the contract documents describing the product or requirement unless otherwise instructed or approved. The Contractor shall use ASTM E 380 and ASTM E 621 as the basis for establishing metric measurements required to be used in submittals.

-- End of Section --

US Army Corps of Engineers

Los Angeles District

Foundation Design Report

Luke Air Force Base

November 1998

MEMORANDUM FOR RECORD

TO: Guner Eruren, Cromwell
FROM: Douglas Chitwood, CESPL-ED-GD
RE: Luke Air Force Base
DATE: April 20, 1999

In lieu of using the shear at the pile cap base, use Kp = 3.0 instead of the 5.22 referred to below.

Please assure that the specifications call out, that should the contractor choose to pour the cap against forms instead of the in situ soil, backfill should be compacted to 95% of ASTM D 1557.

In reply to your request for information:

- The allowable bearing capacity for the footing of the ancillary structure is 3 ksf, gross.
- The coefficient of passive earth pressure is 5.22. As we discussed previously, with reference to the resistance during seismic loading, either Kp can be used, or the shear developed at the base of the pile cap but please do not use both. I recommend using the shear at the base of the cap, primarily because this element is less subject to effects of the method of construction. Should you wish to use the other, please clear it with me first.
- The factor of safety for pile capacity can be reduced to 1.7 for seismic loading for both compression and tension. The assumed factor of safety for both sets of curves presented in the final geotechnical report is 3.0.

Should you have any more questions, please feel free to call me.

1 General

1.1 Scope of Work

The Geotechnical Branch of the Los Angeles District was requested to provide the following services:

- Conduct three soil borings and two pavement borings at specified locations.
- Conduct appropriate tests to determine design values for foundation.
- Develop and submit for early design coordination and review:
  (a) a preliminary foundation design report, detailing subsurface investigations and findings, and
  (b) recommend foundation type and design values. If deep foundations are recommended, provide design values for those pile types that are competitive in the local area; if caissons, with or without bells.
- Develop and submit for documentation of design analysis and approval, a final Foundation Design Report.
- Conduct soil resistivity tests to evaluate the need for cathodic protection.

1.2 Project Description

A new traffic control tower is to be built at Luke Air Force Base. The tower will be located on an island 20 meters west of Building 985 and 50 meters to the east of the existing tower. The new structure will be approximately 12 stories high. Ancillary structures may also be included. No other details are available at this early stage.

1.3 Location/Topography

Luke Air Force Base is located in Maricopa County, Arizona, approximately 30 kilometers west of the city of Phoenix. The Base covers roughly 8 square kilometers with a surface elevation ranging from 340 meters on the north side to 325 meters on the south side. The general topography is a smooth desert plain, which slopes gently southward at a rate of approximately 3.75 meters per kilometer. The Base is 5 kilometers west of the Agua Fria River, which flows southward into the Gila River about 14.5 kilometers south of the Base.

1.4 Geology

All surface and near-surface deposits within several miles of the base consist of alluvium derived from the igneous (granites, diorites, etc.) and metamorphic (massive schists) rock. Most of the coarse materials in the area were derived from metamorphic rock of the White Table Mountains. Much of the fine material encountered in the area is of low plasticity. Additionally, "caliche", a conglomeration of sand, gravel, silt, and clay bonded by carbonates, is present in nearly all soils in the area.

1.5 Groundwater

The water table that provides the bases' water supply slopes southward towards the Gila River and is contained in discontinuous lenses of sand and gravel, interspersed with silt and clay lenses. The groundwater table has been declining for years. The static groundwater level was 44.5 meters below ground surface in 1951; the groundwater level declined to a depth of 245 meters in 1977 due to withdrawl for agriculture and municipal purposes. Perched groundwater has not

been encountered during recent shallow explorations, however, saturated conditions were encountered during airfield construction in 1976.

2 Investigations

2.1 Field Investigations

Field investigations were conducted in October 1998. Three soil borings were drilled with a 200 mm (8-inch) hollow stem auger by West Hazmat of Anaheim, California. The depths of the borings ranged from 9 to 21 meters. The holes were logged by a geotechnical engineer from the Los Angeles District. Samples were collected from the auger cuttings, standard penetrometer, and Modified California sampler. Standard penetration tests (SPT's) were conducted every 1.5 meters. The materials were visually classified and selected samples were collected for testing. Ring samples were collected using the Modified California sampler for direct shear and consolidation tests. Two shallow pavement borings were made in the adjacent roads to verify the thickness of the pavement and nature of underlying materials. The location of the holes and the boring logs are presented in Appendix A.

2.2 Laboratory Investigations

Mechanical analysis, Atterbergs limits, and compaction tests were performed on selected samples at the District laboratory. Direct shear tests were conducted on undisturbed samples by Dames and Moore. The suite of corrosion tests were conducted by M. J. Schiff and Associates. Due to the relative close proximity to the Singapore Beddown site, the similarity of the near-surface materials, and the preference for deep foundations, laboratory strength tests were focused on the deeper materials. USACE (1994) should be referenced for design values for ancillary structures. The test results are presented in Appendices B through D.

3 Site Characterization

The predominate materials at the site range between sandy lean clay and sandy silts, with interspersed zones of silty sand. Density ranges from medium to very dense. Based upon the field investigations, laboratory tests, and evaluation of the data, a site profile, including design values, has been developed. Figure 1 presents that profile.

The two pavement borings were conducted on the roads to the immediate north and south of the island. The borings indicate that the asphalt is 10 centimeters thick, underlain by approximately 30 centimeters of poorly graded silty gravel with silt.

4 Foundation Design

4.1 General

The site was evaluated for both deep and shallow foundations. While both are feasible, piles are recommended due to engineering preference and local precedent. Furthermore, site conditions are favorable for Cast-in-Drilled-Hole (CIDH) piles. This section summarizes the analyses conducted and other concerns.

4.2 Pile Capacity

Piles were evaluated in accordance with EM 1110-2-2906, Design of Pile Foundations. The following assumptions were made:

- Piles act individually, i.e. spacing is such that group action is not significant.
- The angle of friction between the soil and the pile, δ, equals $0.95*\phi$.
- The lateral earth pressure coefficients, K_c (compression piles) and K_t (tension piles), equal 0.95 and 0.5, respectively.

Pile capacity is derived from skin friction and end bearing. While the movement necessary to develop tip resistance in some materials may be several times larger than that required to develop skin friction, field investigations indicate that the materials at depth were quite dense. As a result, the 25 percent of the tip resistance calculated was used in determining the ultimate pile capacity. Material properties shown in Figure 1 were used in the analysis. Figure 2 plots the allowable bearing capacity versus depth for 400, 600 and 900 mm diameter CIDH piles. Figure 3 plots the tensile capacity versus depth. The capacities shown reflect a factor of safety of 3.0.

4.3 Settlement

The program CAXPILE was used to evaluate settlement of the piles. The analysis indicates that for a 880KN load, on a 10 m long, 400 mm pile, the axial displacement of the pile head, including that due to pile deformation, would be less than 10 mm. A modulus of elasticity of 24,800 M Pa was assumed.

4.4 Lateral Loading

Lateral load transfer versus pile deflection, commonly referred to as p-y curves were calculated using methods detailed in Reese et al. For the upper 5 meters, equations based on field tests in stiff clay above the water table were used. At depths greater than 5 meters, equations based on field tests in sand were used. Figures 4 and 5 plot the p-y curves for above and below 5 meters, respectively, for 400 mm piles, and Figures 6 and 7 plot the curves for 600 mm piles.

4.5 Corrosion Potential

Corrosion test were conducted on 2 samples. The results are presented in Appendix D. In addition, data from the Soil Conservation Service indicates that the lean clay in the area poses a high risk of corrosion to uncoated steel and a low risk to concrete. USACE (1994) reports that the soils are severely corrosive at the insitu water content and that the sulfate content is negligible and will not cause deterioration of the subsurface Portland Cement Concrete.

4.6 Summary

In the analyses, the piles were assumed to act individually. ACI 336 states "Drilled piers in a group are considered to act individually when the center-to-center spacing perpendicular to the direction of the applied load is greater than 3d (pile diameters) and when the spacing parallel to the direction of the applied load is greater than or equal to 8d." If the pile spacing in the final design is closer than those limits, it is recommended that the geotechnical engineer review the adequacy of the design.

It should be noted that the cleaner layers of silty sand would be prone to caving. Therefore, it is

recommended that casing be used in those layers during the construction of the piers.

5 Recommendations

Site conditions are favorable for Cast-in-Drilled-Hole (CIDH) piles. Due to their cost efficiency, CIDH piles are recommended for the tower. The geotechnical engineer should review the final design when it becomes available, particularly in relation to foundation details to determine conformance with the intent of the recommendations contained in this report. If the project description varies from that described within this report, the geotechnical engineer should be contacted regarding the applicability of, and any necessary revisions to, the recommendations presented herein. The geotechnical engineer should be contacted to review the final plans and specifications.

6 References

EM 1110-1-1905 (30 Oct 1992), *Bearing Capacity of Soils*

EM 1110-1-1904 (30 Sep 1990), *Settlement Analysis*

EM 1110-2-2906 (15 Jan 1991), *Design of Pile Foundations*

American Concrete Institute (1993), *Design and Construction of Drilled Piers*, ACI 336.3R-93, Detroit MI.

Bowles, Joseph E., (1988), *Foundation Analysis and Design*, Fourth Edition, McGraw Hill, New York, 1004 pp.

Reese, L.C., Cooley, L.A., Radhakrishnan, N., (1984), Technical Report K-84-2, *Laterally Loaded Piles and Computer Program COM624G*, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

USACE, Sacramento District, (April 1994), *Construct Facilities, Singapore Beddown: Final Geotechnical Report*. Prepared for Luke Air Force Base.

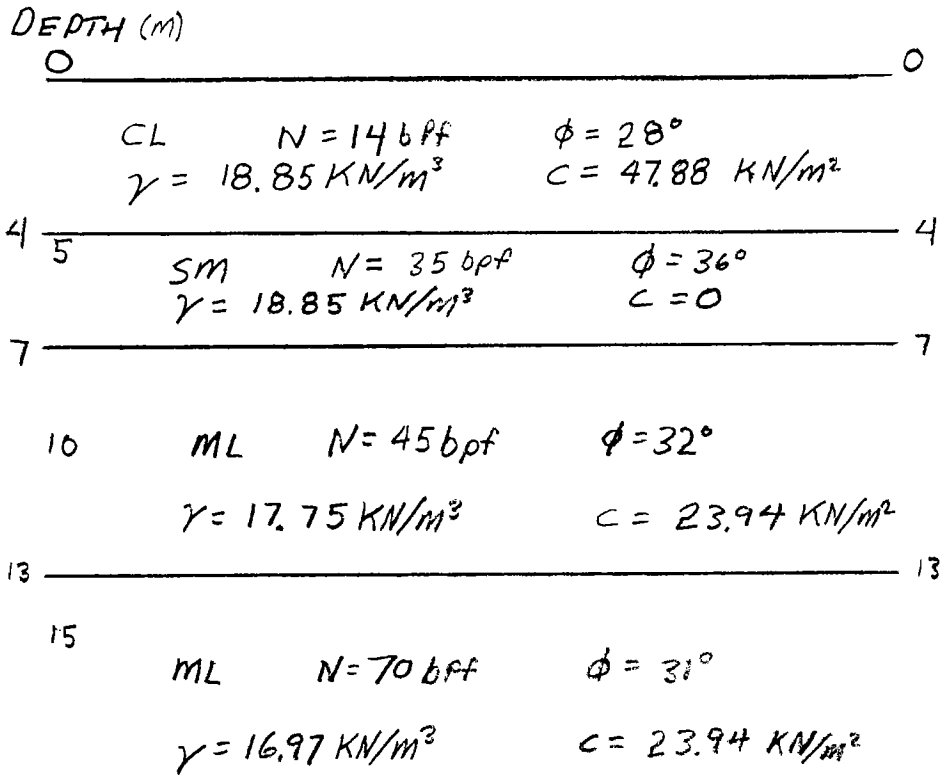
COMPUTATION SHEET

PROJECT LUKE AFB CONTROL TOWER — SHEET NO. ___ OF ___ SHEETS

ITEM COMPOSITE LOG — DATE _____, 19__

FILE _____

COMPUTED BY _____ CHECKED BY _____ — REF. DRWG. NO. _____



bpf = Blows/Foot

SPD FORM 1 OCT 74 284

Figure 1

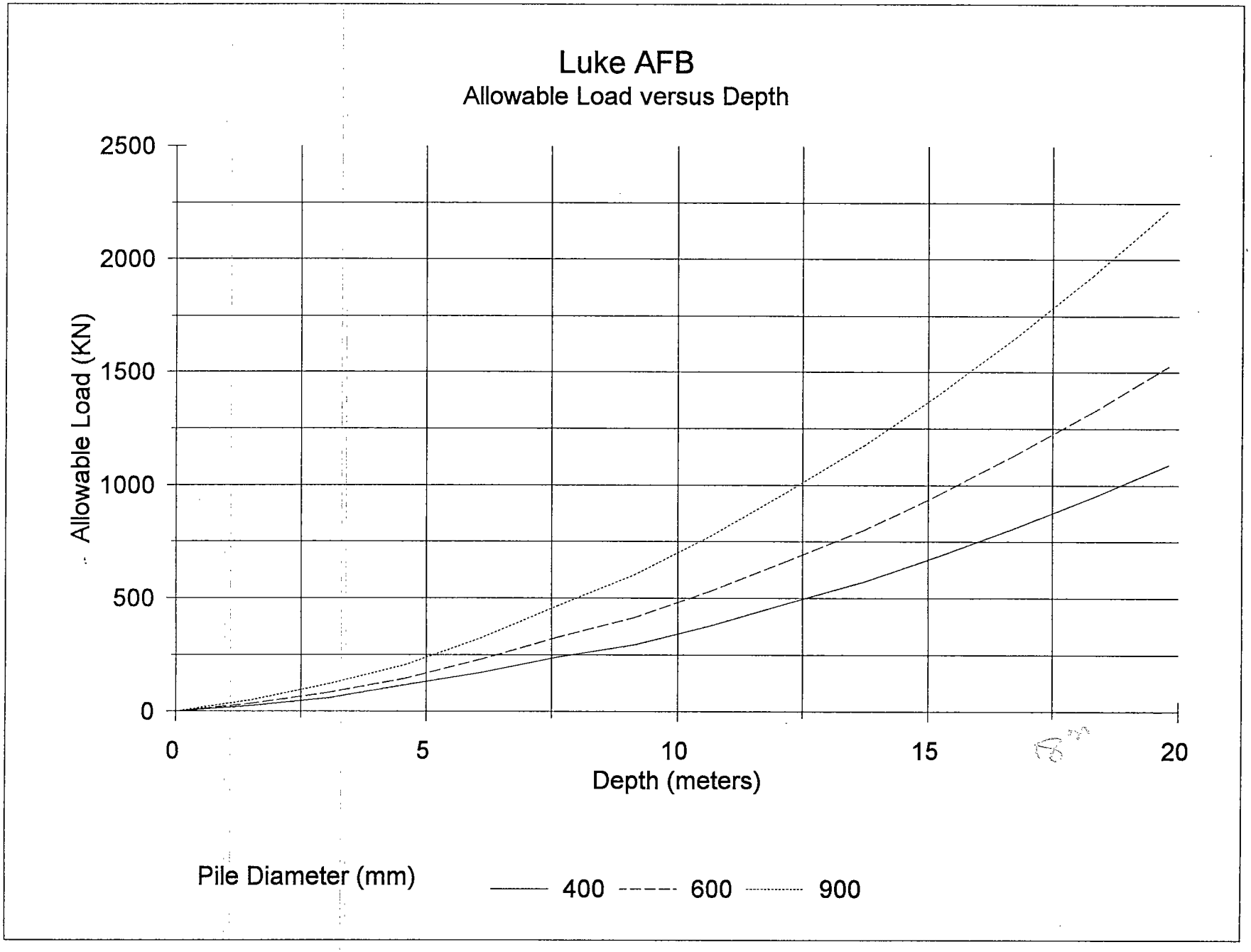

Luke AFB
Allowable Load versus Depth
Allowable Load (KN)
2500
2000
1500
1000
500
0
0
5
10
15
20
Depth (meters)
Pile Diameter (mm)
400
600
900

Figure 2

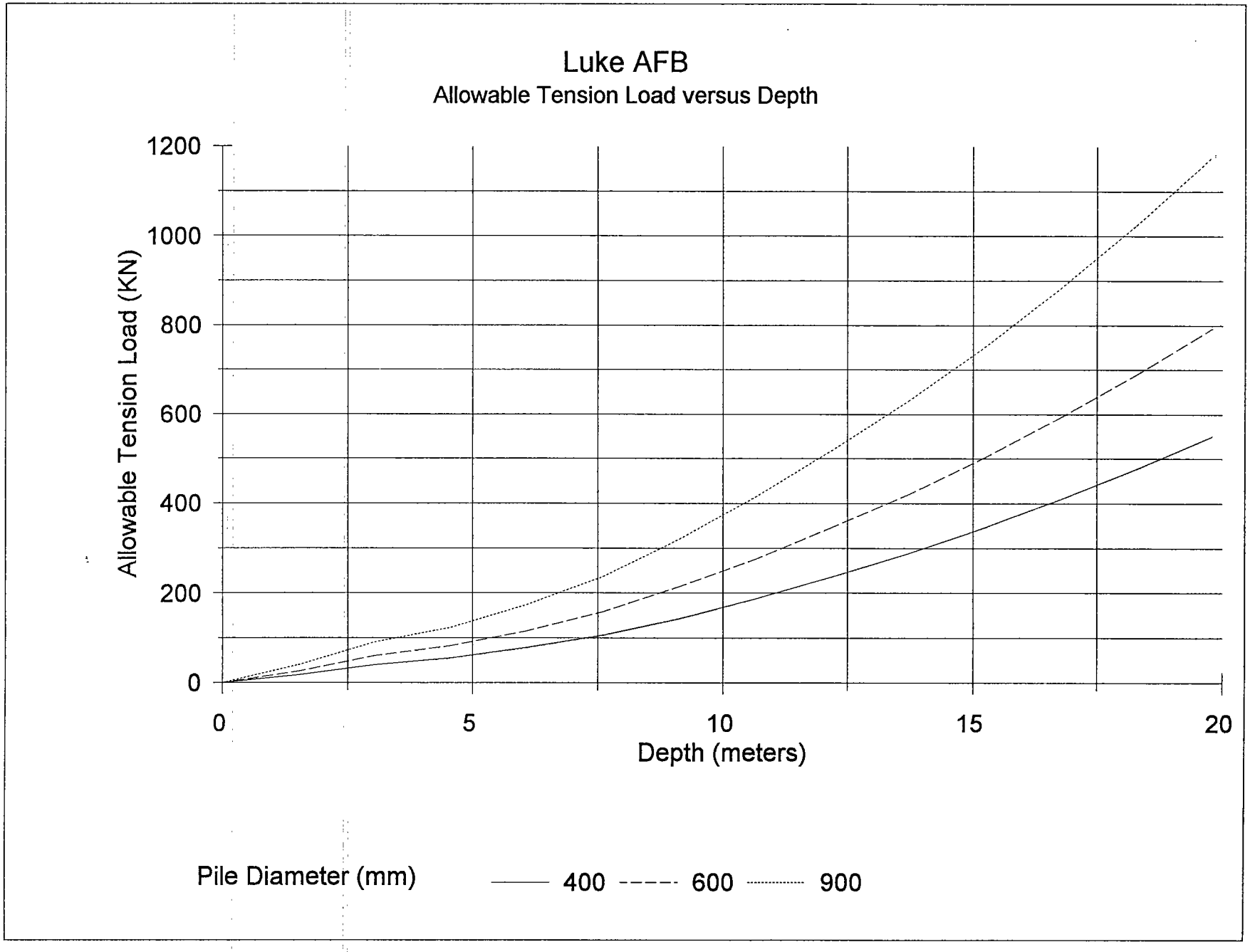

Luke AFB
Allowable Tension Load versus Depth
Allowable Tension Load (KN)
1200
1000
800
600
400
200
0
0
5
10
15
20
Depth (meters)
Pile Diameter (mm)
400
600
900

Figure 3

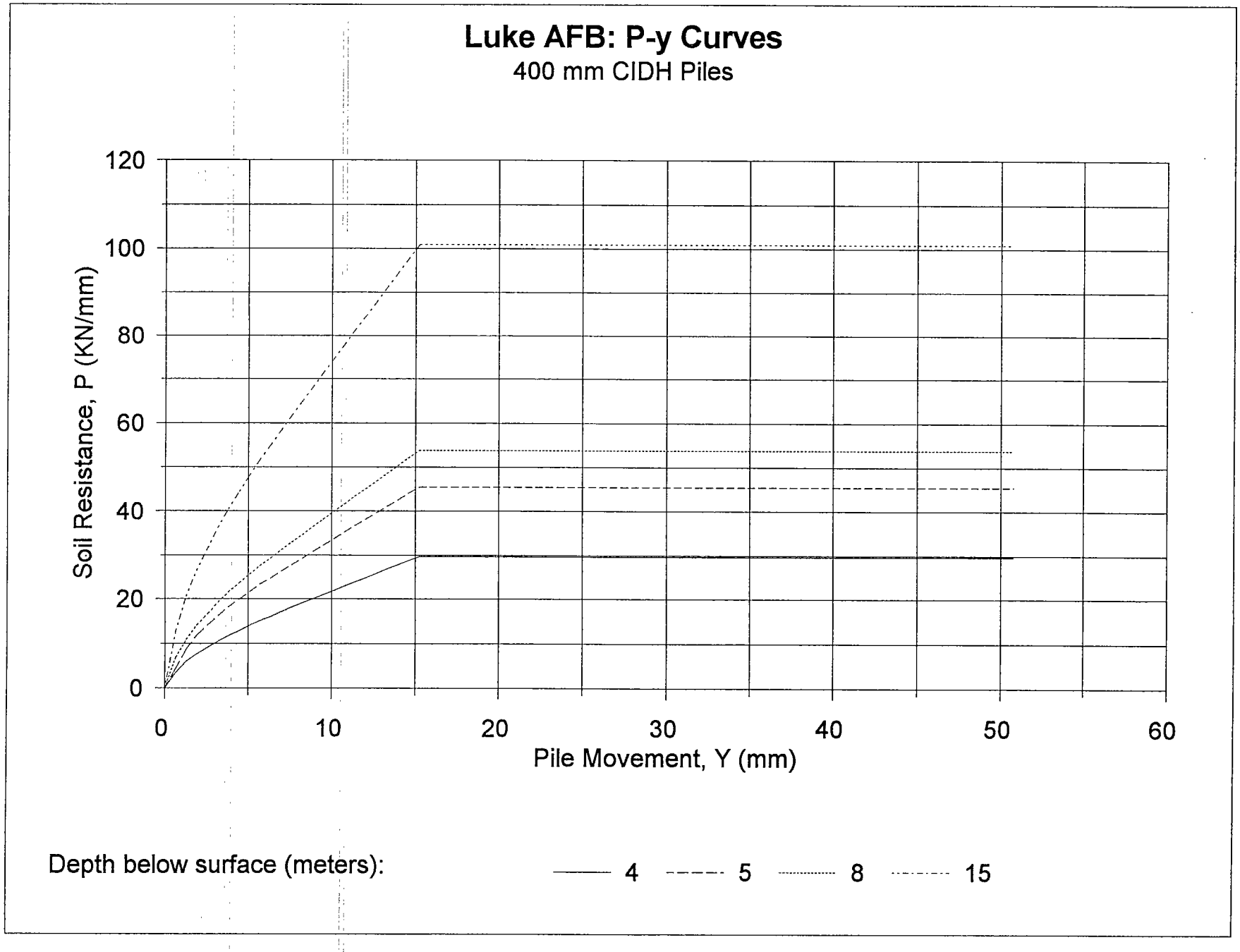

Luke AFB: P-y Curves
400 mm CIDH Piles
Soil Resistance, P (KN/mm)
120
100
80
60
40
20
0
0
10
20
30
40
50
60
Pile Movement, Y (mm)
Depth below surface (meters):
4
5
8
15

Figure 4

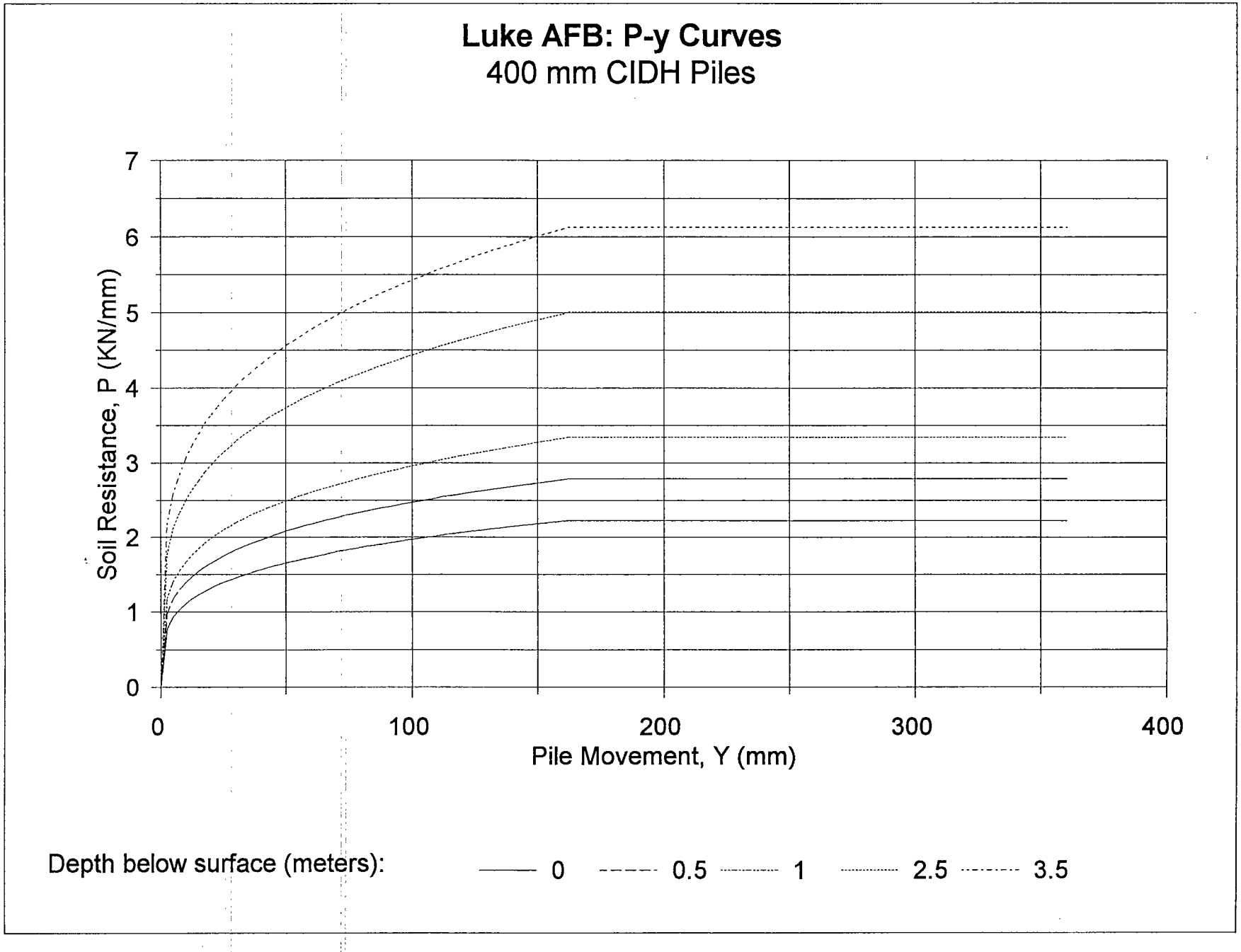

Luke AFB: P-y Curves
400 mm CIDH Piles
Soil Resistance, P (KN/mm)
0
1
2
3
4
5
6
7
0
100
200
300
400
Pile Movement, Y (mm)
Depth below surface (meters):
0
0.5
1
2.5
3.5

Figure 5

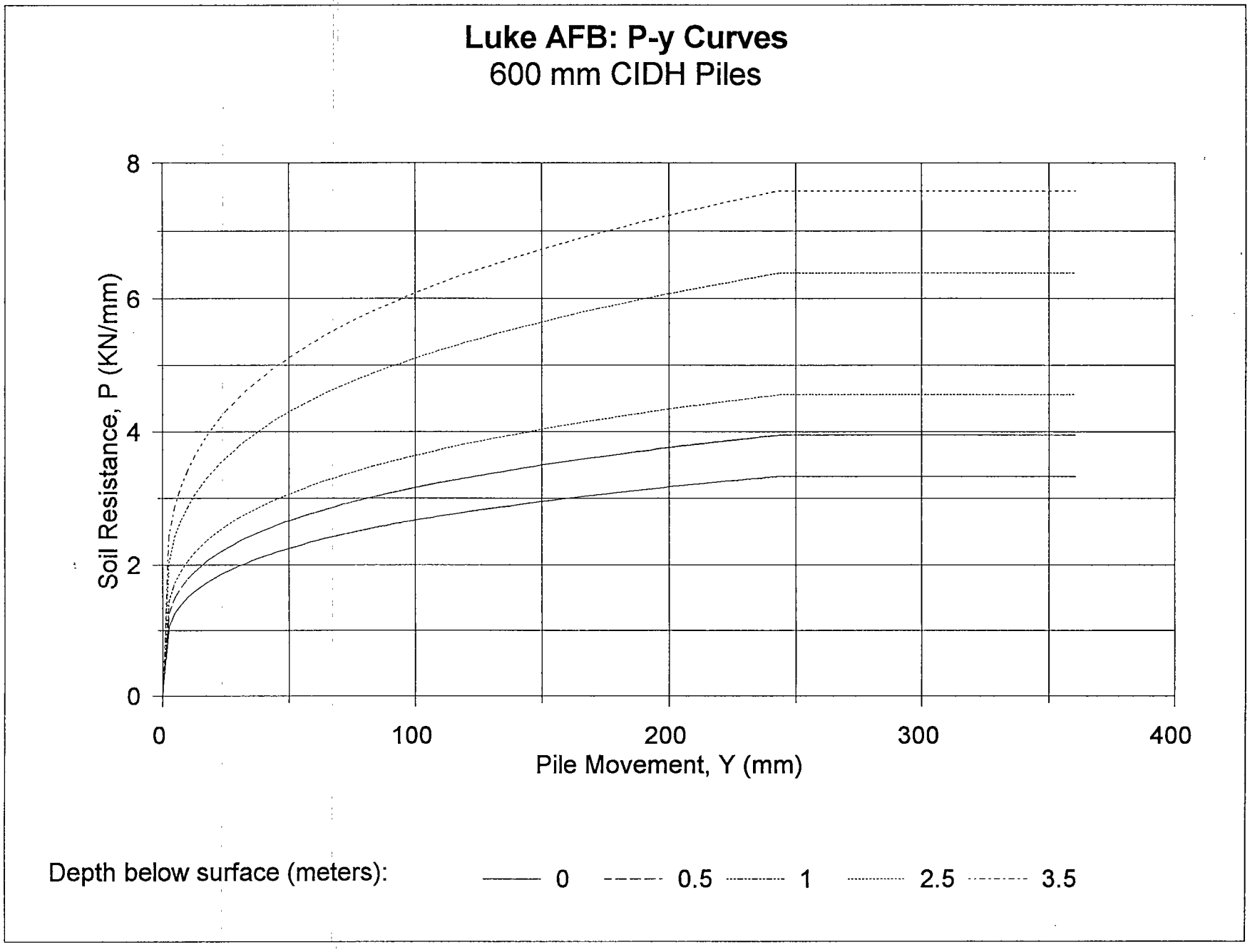

Luke AFB: P-y Curves
600 mm CIDH Piles
Soil Resistance, P (KN/mm)
0
2
4
6
8
0
100
200
300
400
Pile Movement, Y (mm)
Depth below surface (meters):
0
0.5
1
2.5
3.5

Figure 6

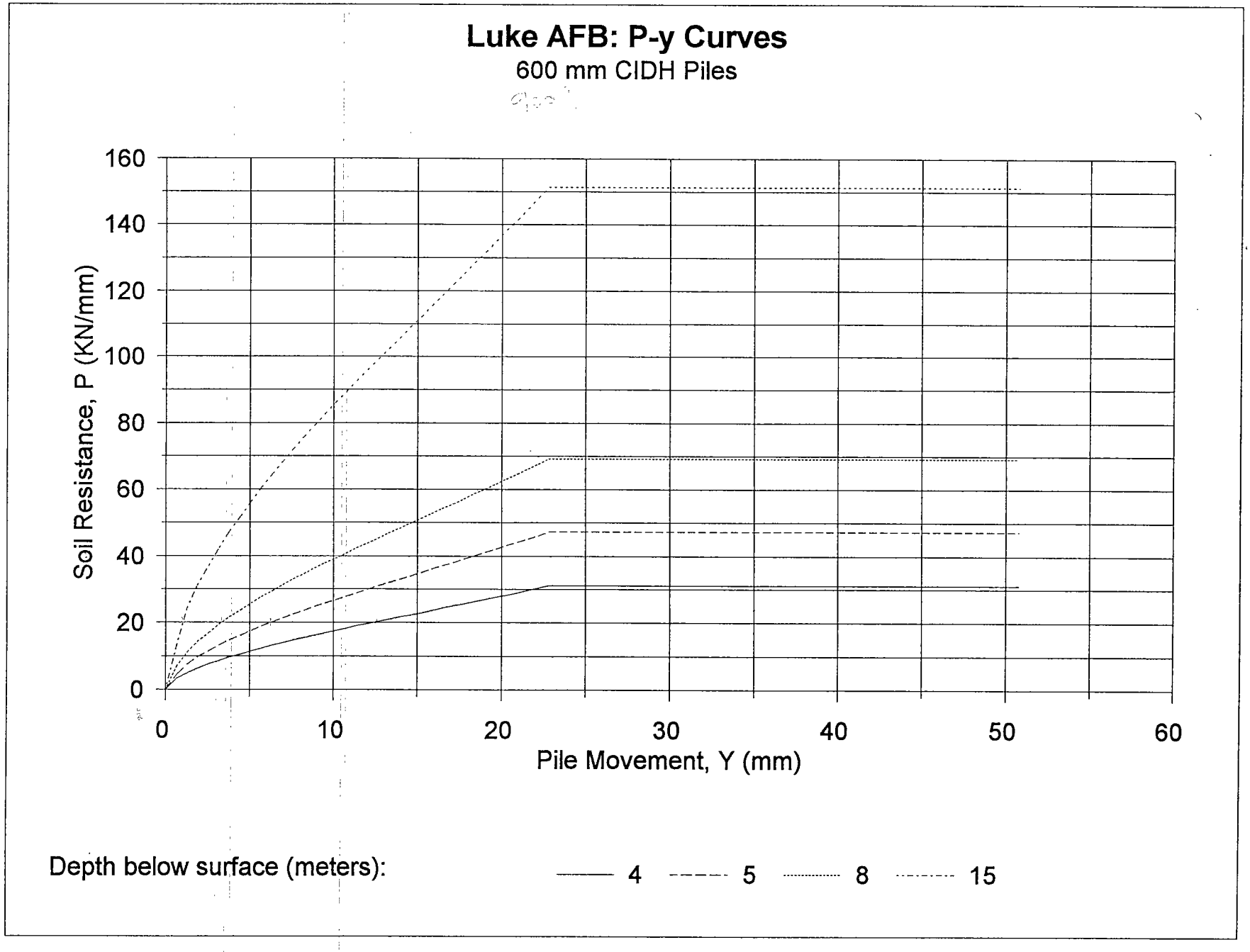

Luke AFB: P-y Curves
600 mm CIDH Piles
Soil Resistance, P (KN/mm)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
Pile Movement, Y (mm)
Depth below surface (meters):
4
5
8
15

Figure 7

TI 809-04 (31 December 1998)
Ground Motion B

T	Sa
0	0.104
0.05	0.2015
0.1	0.260
0.2	0.260
0.3	0.260
0.4	0.260
0.5	0.220
0.6	0.183
0.7	0.157
0.8	0.138
0.9	0.122
1	0.110
1.5	0.073
2	0.055
2.5	0.044
3	0.037
3.5	0.031
4	0.028
4.5	0.024
5	0.022
5.5	0.020
6	0.018
6.5	0.017
7	0.016
7.5	0.015
8	0.014
8.5	0.013
9	0.012
9.5	0.012
10	0.011

Sds =	0.26 g
Sd1 =	0.11 g
To =	0.08 sec
Ts =	0.4 sec

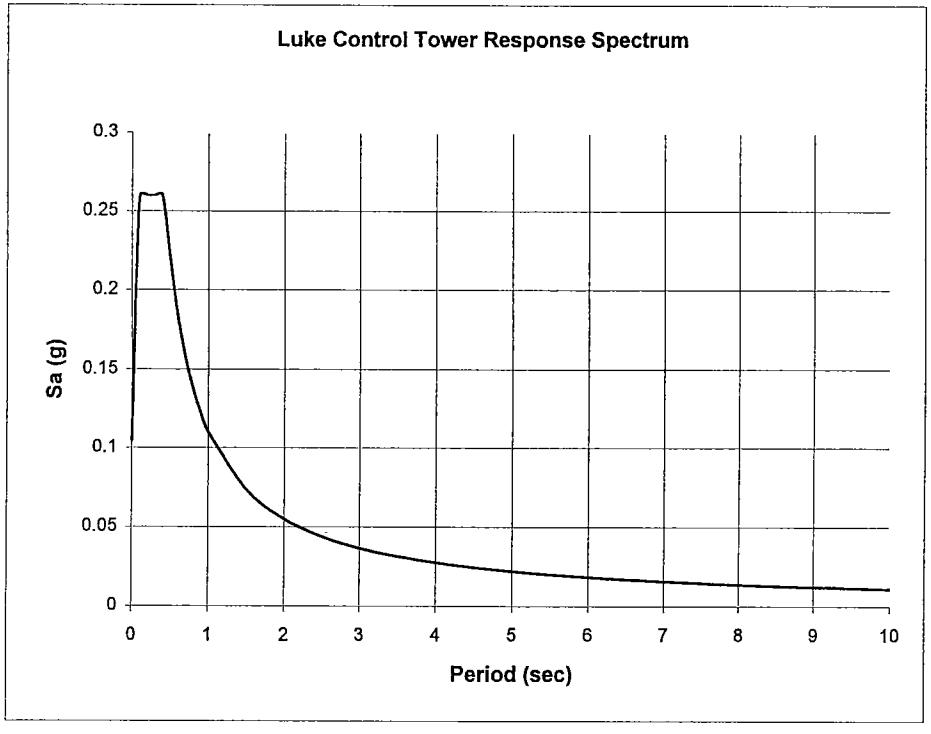
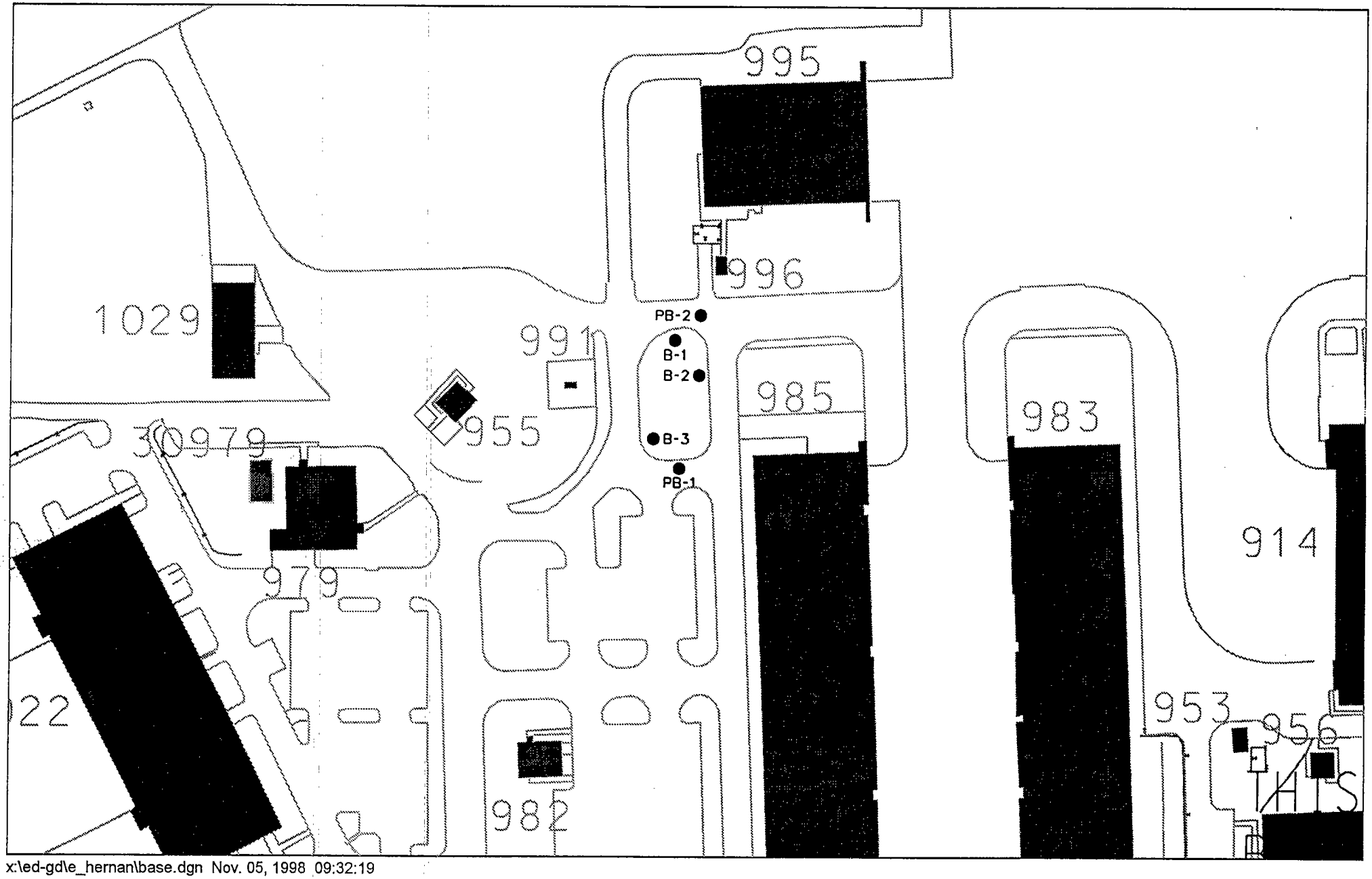


Figure 8

Appendix A:

Boring Logs



x:\ed-gd\e_hernan\base.dgn Nov. 05, 1998 09:32:19

B-1

DEPTH (m)	DEPTH (ft)	SOIL CLASS	MC	LL	PI	MECH. ANAL -4	MECH. ANAL -200	N	DESCRIPTION
									Drilling: light brown, sandy lean clay.
1.5	5.0								
		CL	13.9	34	18	100	60	12	SANDY LEAN CLAY: same as above, medium dense, full recovery.
									Drilling
3.0	10.0								
			13.5					14	yellow-orange, light brown, medium dense, sandy silt.
									Drilling
4.6	15.0								
		SM	4.0		N/P	84	19	29	SILTY SAND WITH GRAVEL: light brown, with little gravel, medium dense.
									Drilling
6.1	20.0								
6.7	22.0		16.3					34	light brown, dense,
								48	MODIFIED CLAIFORNIA SAMPLE MC1-1
7.6	25.0								Drilling
		ML	15.4		N/P	98	74	42	SILT WITH SAND: light brown, yellow-orange, dense.
									Drilling
9.1	30.0								
9.9	32.5	ML	17.7					33	same, more sand, dense, few broken gravels.
								60	MODIFIED CLAIFORNIA SAMPLE MC1-2
10.7	35.0								Drilling
		ML	11.7		N/P	100	54	34	SANDY SILT: light brown, medium dense,
									Drilling
12.2	40.0								
13.0	42.5	ML	12.0					58	same, very dense.
									Drilling
13.7	45.0							75	MODIFIED CLAIFORNIA SAMPLE MC1-3
									Drilling
		CH	15.7	53	33	91	70	X	SANDY FAT CLAY: light brown, very dense, few coarse grain sand, gravel.
									Drilling
15.2	50.0								
16.8	55.0	ML	16.2		N/P	100	74	X	SILT WITH SAND: light brown.
									Drilling
		SP-SM	2.9		N/P	100	6	79	POORLY GRADED SAND WITH SILT: yellow-orange, fine.
									Drilling
18.3	60.0								
		CL	19.4	42	30	100	76	22	LEAN CLAY WITH SAND: light brown.

B-2

DEPTH (m)	DEPTH (ft)	SOIL CLASS	MC	LL	PI	MECH. ANAL -4	MECH. ANAL -200	N	DESCRIPTION
									Drilling: light brown, sandy lean clay..
1.5	5.0								
		CL	16.6					14	SANDY LEAN CLAY: light brown, medium dense, full recovery.
3.0	10.0								
3.7	12.0	CL	13.9					18	SANDY LEAN CLAY: light brown, medium dense.
								94	MODIFIED CALIFORNIA SAMPLE MC2-1
4.6	15.0								
		SM	11.0		N/P	100	39	38	SILTY SAND: light brown, fine sand, few coarse, 10" recovery.
									Drilling
6.1	20.0								
		SM	5.7		N/P	93	15	36	SILTY SAND: light brown, fine sand, few fine gravel.
									Drilling
7.6	25.0								
		CL	11.0					86	light brown, very dense, 8" recovery.
									Drilling
9.1	30.0								
9.1	32.0	SM	11.2					55	SILTY SAND: light brown, 16" recovery.
								75/6"	MC2-2 REFUSAL AT 12".
10.7	35.0								
		SM	7.9		N/P	100	46	52	SILTY SAND: light brown, fine sand, few gravels.
									Drilling: very difficult at almost 40'. Auger had to be pulled to clean flights.
12.2	40.0								
		CL	17.2	35	20	100	78	59	LEAN CLAY WITH FINE SAND: light brown, 14" recovery.
									Drilling
13.7	45.0								
		CL	19.1					79	same.
15.2	50.0								
15.8	52.0	ML	25.2		N/P	96	68	75	SANDY SILT: light brown, laminated with white streaks, clay with fine sand, few medium sand.
								85	MC2-3
16.8	55.0								Drilling
		SP-SM	3.2					67	POORLY GRADED SAND WITH SILT: yellow-orange, loose in sampler.
18.3	60.0								
		ML	15.8					58	SANDY SILT: light brown.
19.8	65.0								
		SM	8.2		N/P	85	29	68	light brown, fine sand, few gravels, full recovery.
									Very difficult drilling
21.3	69.0								
			17.1					71	light brown, silty sand.

B-3

DEPTH (m)	DEPTH (ft)	SOIL CLASS	MC	LL	PI	MECH. ANAL -4	MECH. ANAL -200	N	DESCRIPTION
									Drilling
1.5	5.0								
		CL	15.8					13	SANDY LEAN CLAY: light brown, 12" recovery.
									Drilling
3.0	10.0								
		CL	16.2					60	same.
									Drilling
4.6	15.0								
		SM	8.1					27	SILTY SAND: light brown, fine sand (few medium), few fine gravel.
									Drilling
6.1	20.0								
		SM	10.3					53	same, 8" recovery.
									Drilling
7.6	25.0								
		ML	12.6					63	SILTY WITH SAND: light brown, yellow-orange, laminated, dense.
									Drilling
9.1	30.0								
		ML	12.6			98	74	60	SILT WITH SAND: light brown, fine sand, trace of gravel.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than half of material is larger than no. 200 sieve size.	GRAVELS More than half of coarse fraction is larger than no. 4 sieve size.	Clean Gravels	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
		Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS More than half of coarse fraction is smaller than no. 4 sieve size.	Clean Sands	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands, gravelly sands, little or no fines.
		Sands with fines.	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS More than half of materials smaller than no. 200 sieve size.	SILTS AND CLAYS	Low liquid limit.	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts, with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
		High liquid limit.	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
Highly organic soils			Pt	Peat and other highly organic soils.

NOTES:

1. BOUNDRY CLASSIFICATION: SOILS POSSESSING CHARACTERISTICS OF TWO GROUPS ARE DESIGNATED BY COMBINATIONS OF GROUP SYMBOLS. FOR EXAMPLE, GW-GC, WELL GRADED GRAVEL-SAND MIXTURE WITH CLAY BINDER.
2. ALL SIEVE SIZES ON THE CHART ARE U.S. STANDARD.
3. THE TERMS "SILT" AND "CLAY" ARE USED RESPECTIVELY TO DISTINGUISH MATERIALS EXHIBITING LOWER PLASTICITY FROM THOSE WITH HIGHER PLASTICITY. THE MINUS NO. 200 SIEVE MATERIAL IS SILT IF THE LIQUID LIMIT AND PLASTICITY INDEX PLOT BELOW THE "A" LINE ON THE PLASTICITY CHART, AND IS CLAY IF THE LIQUID LIMIT AND PLASTICITY INDEX PLOT ABOVE THE "A" LINE ON THE CHART.
4. THE SOIL CLASSIFICATION SYSTEM IS BASED ON THE AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM).
   A. (ASTM) D2487 STANDARD TEST METHOD FOR CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES.
   B. (ASTM) D2488 STANDARD RECOMMENDED PRACTICE FOR DESCRIPTION OF SOILS (VISUAL MANUAL PROCEDURE).

GENERAL NOTES:

1. BORING DRILLED WITH AN 8" HOLLOW STEM AUGER.
2. SAMPLES ARE CLASSIFIED PER THE UNIFIED SOIL CLASSIFICATION SYSTEM.
3. CLASSIFICATION FOR MATERIAL WITHOUT GRADATION OR ATTERBERG DATA ARE BASED ON COMPARISONS WITH OTHER SAMPLES WHERE SUCH DATA HAS BEEN USED TO CLASSIFY.
4. INVESTIGATION CONDUCTED OCTOBER 1998.
5. DRILLING PERFORMED BY WEST HAZMAT.
6. PB-1 AND PB-2 ARE SHALLOW PAVEMENT BORINGS WHICH INDICATED THAT THE ASPHALT IS 10cm THICK, UNDERLAIN BY APPROXIMATELY 30cm OF POORLY GRADED GRAVEL WITH SILT.

4FT 2 0 4 8FT

1.5m 0.75 0 1.5 3m

DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
	REVISIONS		

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

DESIGNED BY: D. CHITWOOD
DRAWN BY: E. HERNANDEZ
CHECKED BY: D. CHITWOOD

LUKE AIR FORCE BASE CONTRL TOWER INVESTIGATION

SUBMITTED BY: ABBAS T. ROODSARI DIST. GEOTECHNICAL BRANCH
DATE APPROVED:
SPEC. NO. DACW09-
DISTRICT FILE NO.
SHEET

PEBBLES: GEOTECHNICAL\LUKE_AFB

Appendix B

Laboratory Results:

Gradation and Compaction Tests

PROJECT: **LUKE AIRFORCE BASE**

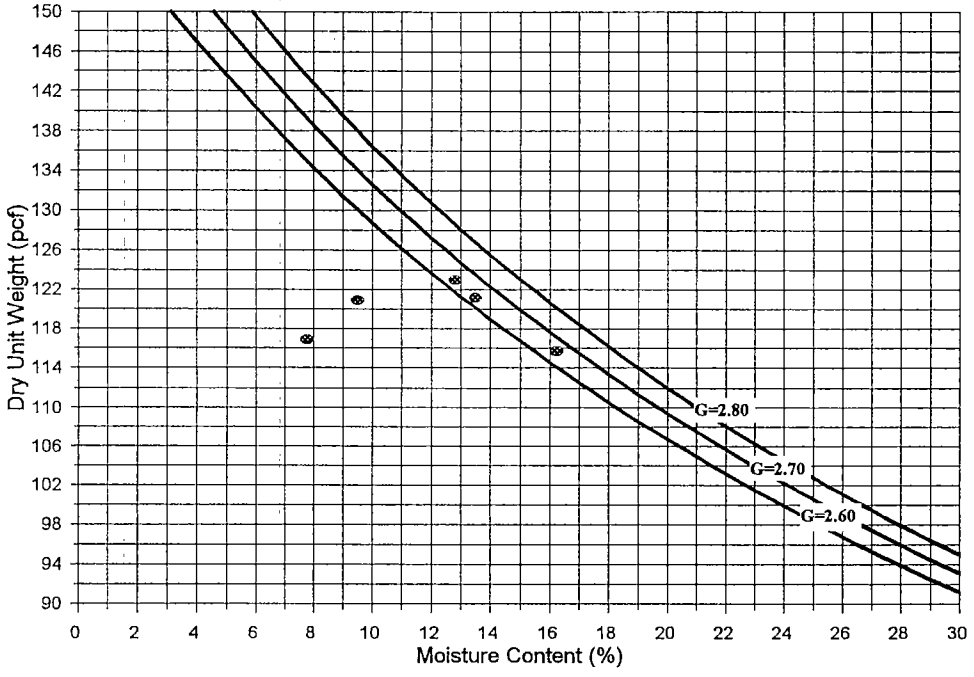
17 <-- Number of samples

27-Oct-98

Lab No.	Hole No.	Depth Top	Depth Bot	GRAVEL (in) 3.0	1.5	3/4	3/8	SAND (sieve no.) 4	8	16	30	50	100	FINES 200	Atterberg Limits LL	PI	Field Data M.C.	Density		
023	B-2		15.0	100	100	100	100	100	98	94	86	72	55	39		N/P	11.0		SM	SILTY SAND
024	B-2		20.0	100	100	100	98	93	90	83	63	36	23	15		N/P	5.7		SM	SILTY SAND
025	B-2		35.0	100	100	100	100	100	98	94	89	79	63	46		N/P	7.9		SM	SILTY SAND
026	B-2		40.0	100	100	100	100	100	99	97	94	91	87	78	35	20	17.2		CL	LEAN CLAY WITH SAND
027	B-2		50.0	100	100	100	98	96	94	91	86	80	76	68		N/P	25.2		ML	SANDY SILT
028	B-2		65.0	100	100	97	90	85	80	72	62	47	37	29		N/P	8.2		SM	SILTY SAND WITH GRAVEL
029	B-3		30.0	100	100	100	100	100	96	93	89	86	83	64			12.6		ML	SANDY SILT
030	B-1	5.0	6.5	100	100	100	100	100	98	94	87	77	68	60	34	~~N/P~~	13.9	CL-ML	~~SANDY SILT~~	SANDY LEAN CLAY
031	B-1	15.0	16.5	100	100	96	90	84	78	69	54	37	26	19		N/P	4.0		SM	SILTY SAND WITH GRAVEL
032	B-1	25.0	26.5	100	100	100	98	98	97	96	94	91	86	74			15.4		ML	SILT WITH SAND
033	B-1	35.0	36.5	100	100	100	100	100	99	96	88	79	68	54		N/P	11.7		ML	SANDY SILT
034	B-1	45.0	46.5	100	100	100	93	91	84	79	77	76	74	70	53	33	15.7		CH	SANDY FAT CLAY
035	B-1	50.0	51.5	100	100	100	100	100	99	95	91	86	81	74			16.2		ML	SILT WITH SAND
036	B-1	55.0	56.5	100	100	100	100	100	99	94	70	29	12	6		N/P	2.9		SP-SM	POORLY GRADED SAND WITH SILT
037	B-1	60.0	61.5	100	100	100	100	100	99	98	95	90	88	76	42	30	19.4		CL	LEAN CLAY WITH SAND
038	Compaction			100	100	100	100	99	97	93	86	76	69	61	34	18			CL	SANDY LEAN CLAY
039	Compaction			100	100	99	97	95	93	90	86	81	81	70	31	15			CL	SANDY LEAN CLAY

Note: Lab no's 32 & 35 had insufficient material for atterbergs, 29 needs to be ran for atterberg

SOIL COMPACTION TEST RESULT



Blows per layer	25
No. of layers	5
Tamper Weight	10
Drop Height	18
Mold Diameter	4
Volume of Sample	0.03301

Opt. Moisture Content	
Max. Dry Unit Weight	

MECHANICAL ANALYSIS

GRAVEL (in)				SAND (sieve no.)						FINES	Atterberg limit	
3.0	1.5	3/4	3/8	4	8	16	30	50	100	200	LL	PI
100	100	100	100	99	97	93	86	76	69	61		

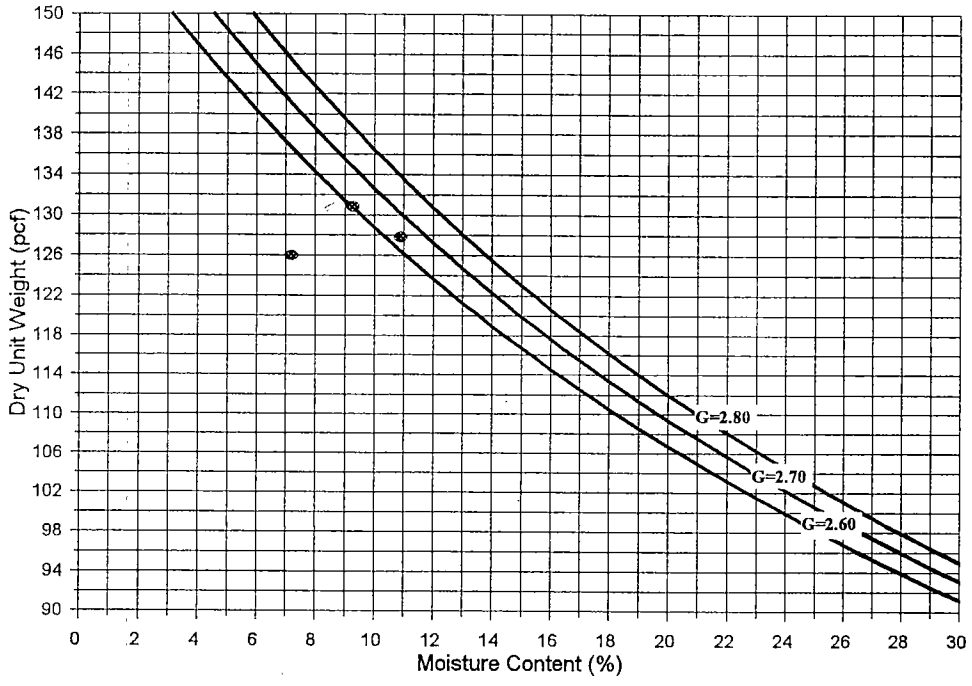
Compaction Sample No.	8 %	12 %	14 %	16 %	10%
Wgt. of Wet Soil & Mold	19.60	20.00	19.98	19.86	19.80
Wgt. of Mold	15.42	15.42	15.42	15.42	15.42
Wgt. of Wet Soil	4.18	4.58	4.56	4.44	4.38
WET UNIT WEIGHT	126.63	138.75	138.14	134.50	132.69
Moisture Sample No.	7	24	5	31	6
Wgt. of Wet Soil & Tare	6.48	5.64	5.64	5.48	6.68
Wgt. of Dry Soil & Tare	6.18	5.12	5.10	4.86	6.30
Wgt. of Water	0.30	0.52	0.54	0.62	0.38
Wgt. of Tare	2.32	1.06	1.10	1.04	2.31
Wgt. of Dry Soil	3.86	4.06	4.00	3.82	3.99
MOISTURE CONTENT	**7.8**	**12.8**	**13.5**	**16.2**	**9.5**
DRY UNIT WEIGHT	**116.9**	**123.0**	**121.2**	**115.7**	**120.9**

Lab No.	038
Hole No.	
Depth	
Date	24-Oct-98

ASTM D 1557 - 91
MODIFIED COMPACTION

Soil Type	
PROJECT	**LUKE AIRFORCE BASE**

SOIL COMPACTION TEST RESULT



Blows per layer	25
No. of layers	5
Tamper Weight	10
Drop Height	18
Mold Diameter	4
Volume of Sample	0.03301

Opt. Moisture Content	
Max. Dry Unit Weight	

MECHANICAL ANALYSIS

GRAVEL (in)				SAND (sieve no.)						FINES	Atterberg limit	
3.0	1.5	3/4	3/8	4	8	16	30	50	100	200	LL	PI
100	100	99	97	95	93	90	86	81	81	70	31	15

Compaction Sample No.	8 %	10 %	12 %	0	0
Wgt. of Wet Soil & Mold	19.60	20.16	20.12	0.00	0.00
Wgt. of Mold	15.42	15.42	15.42	0.00	0.00
Wgt. of Wet Soil	4.18	4.74	4.70	0.00	0.00
WET UNIT WEIGHT	126.63	143.59	142.38	0.00	0.00
Moisture Sample No.	17	10	BP	0	0
Wgt. of Wet Soil & Tare	6.78	7.02	5.76	0.00	0.00
Wgt. of Dry Soil & Tare	6.48	6.62	5.30	0.00	0.00
Wgt. of Water	0.30	0.40	0.46	0.00	0.00
Wgt. of Tare	2.32	2.30	1.08	0.00	0.00
Wgt. of Dry Soil	4.16	4.32	4.22	0.00	0.00
MOISTURE CONTENT	**7.2**	**9.3**	**10.9**	**ERR**	**ERR**
DRY UNIT WEIGHT	**126.0**	**130.9**	**127.8**	**0.0**	**0.0**

Lab No.	039
Hole No.	
Depth	
Date	24-Oct-98

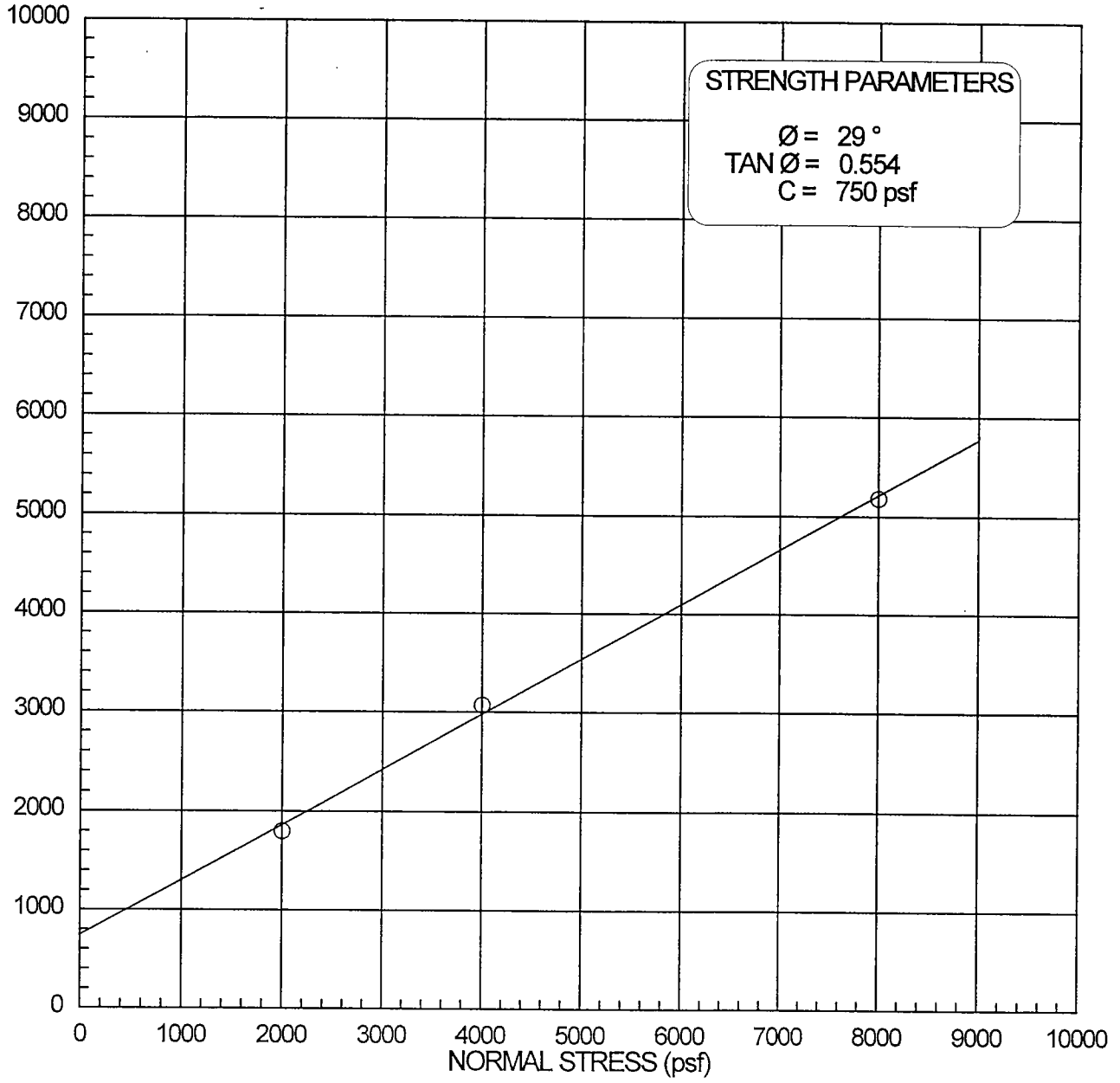
ASTM D 1557 - 91
MODIFIED COMPACTION

Soil Type	
PROJECT	**LUKE AIRFORCE BASE**

Appendix C

Laboratory Results:

Direct Shear Test Results



BORING NO.	SAMPLE NO.	DEPTH (ft.)	Moisture (%) / Density (pcf)	NORMAL STRESS (psf)	MAX. SHEAR STRESS (psf)
MC-1-1A	N/A	22.5-23.0	10.5 / 101.7	2000	1800
			10.9 / 101.1	4000	3072
			11.6 / 104.5	8000	5184

Sample Description: Yellowish brown silty SAND (SM)

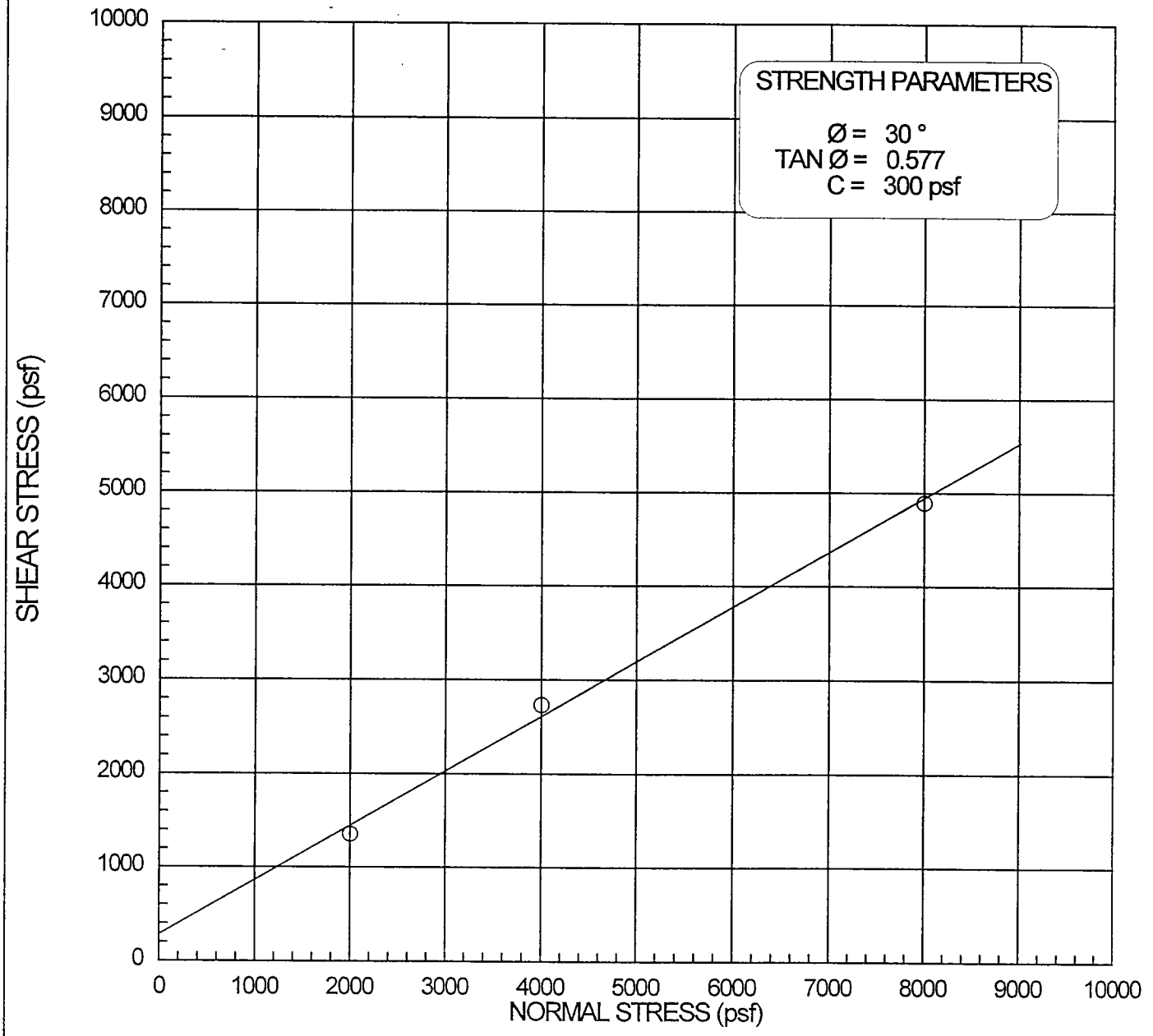
STRAIN RATE = 0.0025 (in/min)

LUKE AIR FORCE BASE
Glendale, ARIZONA
For: U.S. Army Corps of Engineers

CONSOLIDATED DRAINED
DIRECT SHEAR TEST RESULTS
(ASTM D3080)

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

Figure



BORING NO.	SAMPLE NO.	DEPTH (ft.)	Moisture (%) / Density (pcf)	NORMAL STRESS (psf)	MAX. SHEAR STRESS (psf)
MC-1-2A	N/A	33.5 - 34' N/A	10.2 / 98.4	2000	1356
			11.2 / 100.8	4000	2736
			10.1 / 101.8	8000	4896

Sample Description: Brown silty SAND (SM)

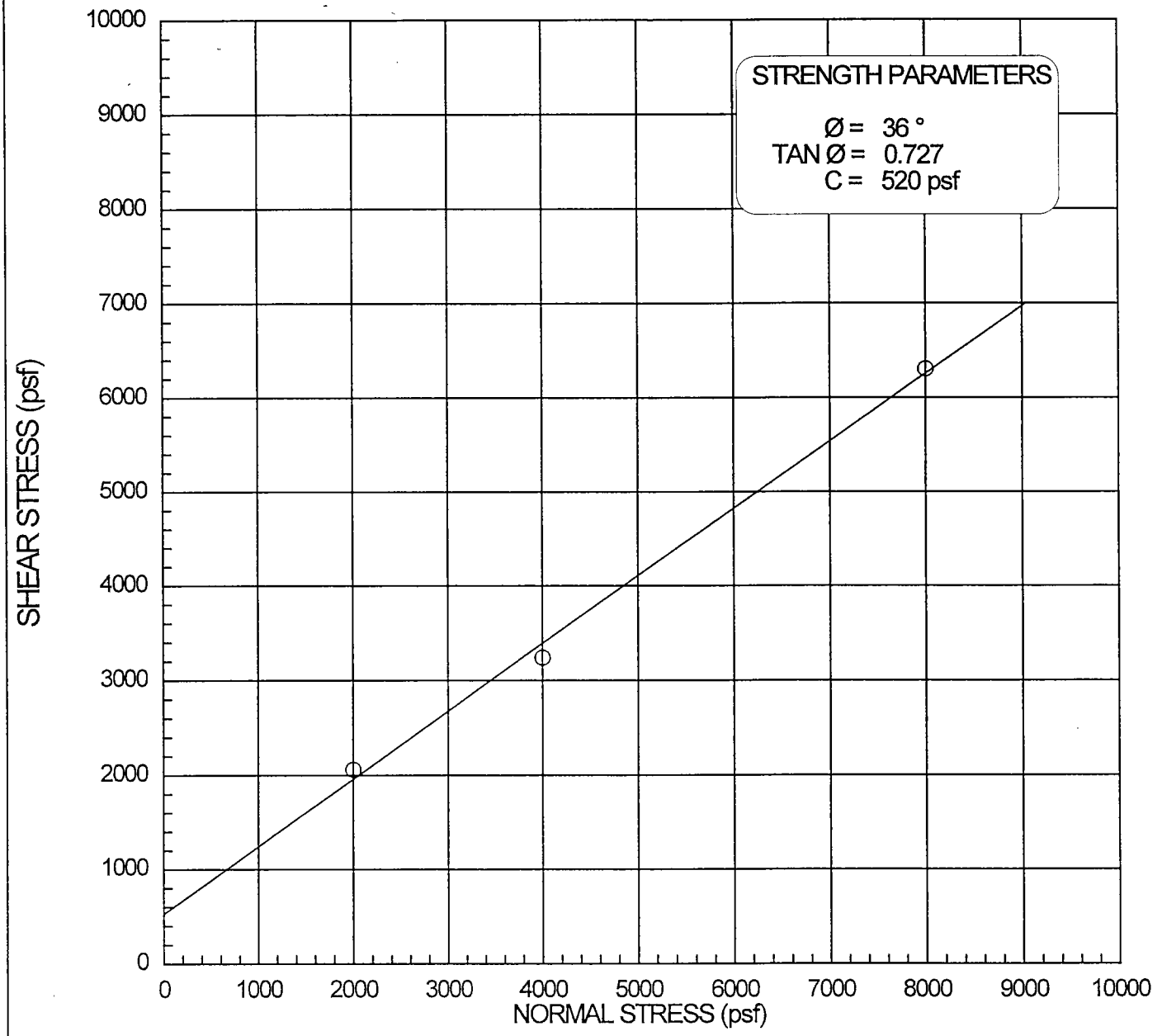
STRAIN RATE = 0.0025 (in/min)

LUKE AIR FORCE BASE
Glendale, ARIZONA
For: U.S. Army Corps of Engineers

CONSOLIDATED DRAINED
DIRECT SHEAR TEST RESULTS
(ASTM D3080)

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

Figure



BORING NO.	SAMPLE NO.	DEPTH (ft.)	Moisture (%) / Density (pcf)	NORMAL STRESS (psf)	MAX. SHEAR STRESS (psf)
MC-1-3A	N/A	43.5-44 N/A	13.6 / 102.3	2000	2059
			14.8 / 102.1	4000	3242
			14.2 / 105.7	8000	6305

Sample Description: Brown sandy SILT (ML) trace gravel

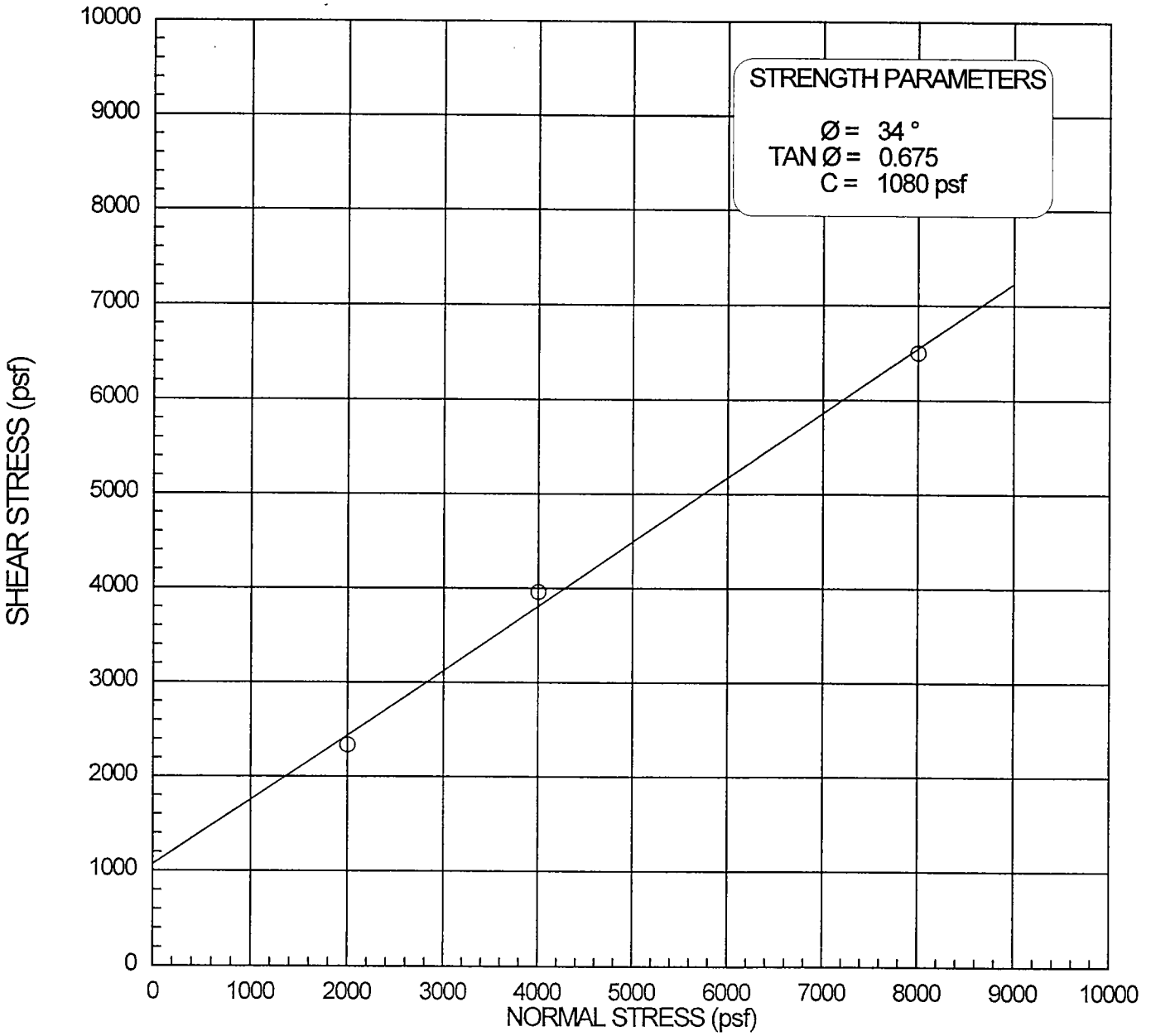
STRAIN RATE = 0.0025 (in/min)

LUKE AIR FORCE BASE
Glendale, ARIZONA
For: U.S. Army Corps of Engineers

CONSOLIDATED DRAINED
DIRECT SHEAR TEST RESULTS
(ASTM D3080)

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

Figure



BORING NO.	SAMPLE NO.	DEPTH (ft.)	Moisture (%) / Density (pcf)	NORMAL STRESS (psf)	MAX. SHEAR STRESS (psf)
MC-2-1A	N/A	13 - 13.5 N/A	10.2 / 109.3	2000	2059
			10.5 / 109.5	4000	3242
			10.0 / 107.2	8000	6305

Sample Description: Yellowish brown ilty SAND (SM)

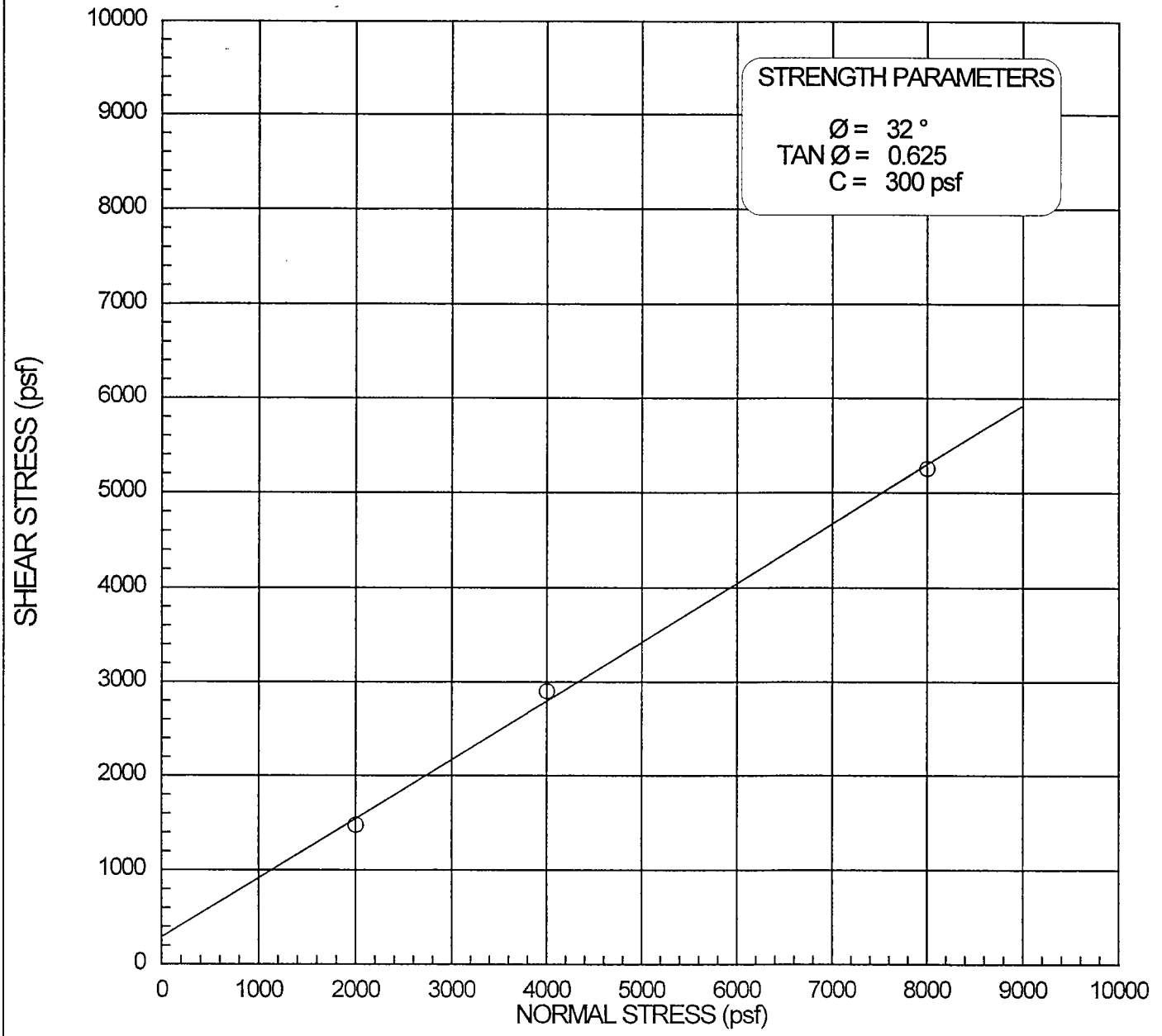
STRAIN RATE = 0.0025 (in/min)

LUKE AIR FORCE BASE
Glendale, ARIZONA
For: U.S. Army Corps of Engineers

CONSOLIDATED DRAINED
DIRECT SHEAR TEST RESULTS
(ASTM D3080)

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

Figure



BORING NO.	SAMPLE NO.	DEPTH (ft.)	Moisture (%) / Density (pcf)	NORMAL STRESS (psf)	MAX. SHEAR STRESS (psf)
MC-2-2A	N/A	N/A	10.1 / 105.9	2000	1476
			10.6 / 107.2	4000	2904
			11.1 / 101.1	8000	5256

Sample Description: Brown silty SAND (SM)

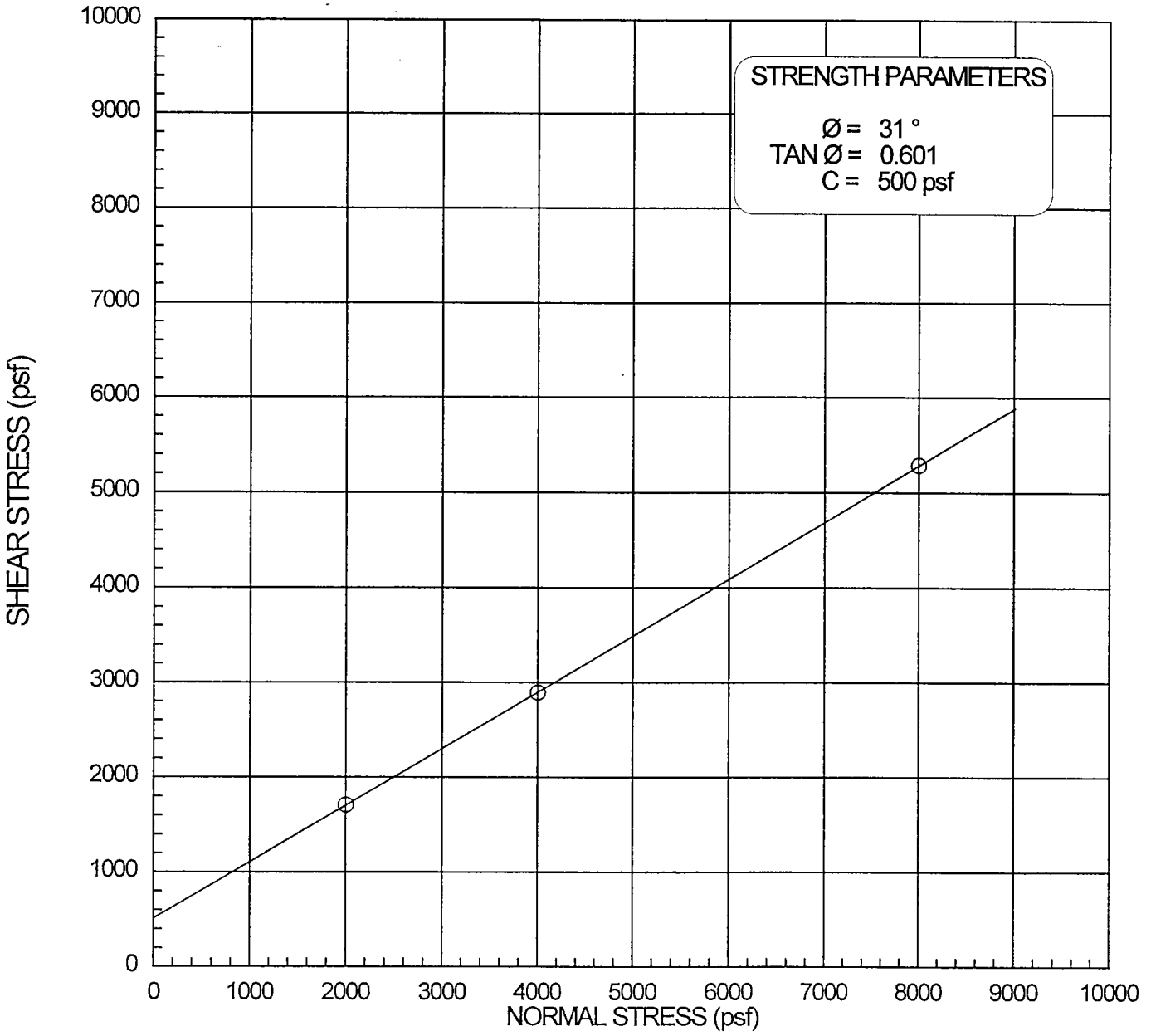
STRAIN RATE = 0.0025 (in/min)

LUKE AIR FORCE BASE
Glendale, ARIZONA
For: U.S. Army Corps of Engineers

CONSOLIDATED DRAINED
DIRECT SHEAR TEST RESULTS
(ASTM D3080)

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

Figure



BORING NO.	SAMPLE NO.	DEPTH (ft.)	Moisture (%) / Density (pcf)	NORMAL STRESS (psf)	MAX. SHEAR STRESS (psf)
MC-2-3A	N/A	53 - 53.5 N/A	9.2 / 96.8	2000	1708
			10.2 / 97.1	4000	2896
			10.8 / 99.3	8000	5291

Sample Description: Brown silty SAND (SM)

STRAIN RATE = 0.0025 (in/min)

LUKE AIR FORCE BASE
Glendale, ARIZONA
For: U.S. Army Corps of Engineers

CONSOLIDATED DRAINED
DIRECT SHEAR TEST RESULTS
(ASTM D3080)

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

Figure

Appendix D

Laboratory Results:

Corrosion Test Results

M. J. Schiff & Associates, Inc.
Consulting Corrosion Engineers - Since 1959
1308 Monte Vista Avenue, Suite 6
Upland, CA 9178-8224
Phone: 909/931-1360

Table 1 - Laboratory Tests on Soil Samples

Luke AFB, Arizona
Your #37437-002-015, MJS&A #98437
23-Oct-98

Sample ID			B-2 / Grab #2 @ 0 - 5'	B-2 / Grab #3 @ 5' - 10'
Resistivity		**Units**		
as-received		ohm-cm	2,300	70,000
saturated		ohm-cm	550	855
pH			8.2	8.4
Electrical				
Conductivity		mS/cm	0.59	0.48
Chemical Analyses				
Cations				
calcium	Ca^{2+}	mg/kg	24	28
magnesium	Mg^{2+}	mg/kg	7	10
sodium	Na^{1+}	mg/kg	584	420
Anions				
carbonate	CO_3^{2-}	mg/kg	66	66
bicarbonate	HCO_3^{1-}	mg/kg	439	391
chloride	Cl^{1-}	mg/kg	ND	25
sulfate	SO_4^{2-}	mg/kg	854	537
Other Tests				
ammonium	NH_4^{1+}	mg/kg	0.4	0.4
nitrate	NO_3^{1-}	mg/kg	18.8	16.0
sulfide	S^{2-}	qual	na	na
Redox		mv	na	na

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

SECTION TABLE OF CONTENTS

DIVISION 14 - CONVEYING SYSTEMS

SECTION 14210

ELEVATORS, ELECTRIC

-- End of Section Table of Contents --

SECTION 14210

ELEVATORS, ELECTRIC

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 176	(1996) Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip
ASTM A 366/A 366M	(1996) Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality
ASTM A 568/A 568M	(1996) Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A 569/A 569M	(1996) Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality
ASTM A 666	(1996a) Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM E 84	(1996a) Surface Burning Characteristics of Building Materials

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A17.1	(1993) Safety Code for Elevators and Escalators
ASME A17.2.1	(1993) Inspectors' Manual for Electric Elevators
ASME QEI-1	(1993; Addenda: QEI-1a-1995) Standard for the Qualification of Elevator Inspectors

CODE OF FEDERAL REGULATIONS (CFR)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities

FEDERAL STANDARDS (FED-STD)

FED-STD 795	(Basic) Uniform Federal Accessibility Standards

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.11	(1993) IEEE Standard Metal-Oxide Surge Arresters for AC Power Circuits
IEEE C62.41	(1991) Surge Voltages in Low-Voltage AC Power Circuits
IEEE C62.45	(1992) IEEE Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits
IEEE Std 304	(1977; R 1991) Test Procedure for Evaluation and Classification of Insulation Systems for Direct-Current Machines

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

ICBO-01	(1994) Uniform Building Code (3 Vol.)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3	(1995) High-Pressure Decorative Laminates
NEMA MG 1	(1993; Rev 1; Rev 2; Rev 3) Motors and Generators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1996; Errata) National Electrical Code
NFPA 252	(1995) Fire Test of Door Assemblies

UNDERWRITERS LABORATORIES (UL)

UL 1449	(1985; Errata Apr 1986) Transient Voltage Surge Suppressors

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation. Submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Training Data; FIO.

Information describing the training course for operating personnel, training aids and samples of training aids and samples of training materials to be used, training schedules, and notification of training.

Elevator System; FIO.

A complete list of equipment and material, including illustrations, schedules, manufacturer’s descriptive data and technical literature, performance charts, catalog cuts, installation instructions, brochures,

diagrams, and other information required for fabrication and installation of the equipment. Data shall include calculations for reaction loads imposed on building by elevator systems. Calculations to demonstrate compliance with ASME A17.1, Rule XXIV, and to demonstrate that the proposed elevator system meets requirements for seismic loading of zone 1 in accordance with ICBO-01; certified copies of test reports may be submitted on lieu of calculations. Spare parts data for each different item of material and equipment specified, after approval of detail drawings and not later than four weeks prior to date of beneficial occupancy. Data shall include a complete list of parts and supplies, with current unit prices and source of supply, and a list of parts recommended to be replaced and replacement interval required. Data shall include the appropriate sizing of electrical protective devices.

SD-04 Drawings

Elevator System; FIO

Detail drawings including dimensioned layouts in plan and elevation showing the arrangement of elevator equipment, anchorage of equipment, clearances for maintenance and operation; and details on hoistway, doors and frames, operation and signal stations, controllers, motors, guide rails and brackets, and points of interface with normal power fire alarm system HVAC or exhaust systems and interface with emergency power systems. Drawings shall show any revised building electrical system required to make supplied elevator system function as specified. Drawings shall contain complete wiring diagrams showing electrical connections and other details required to demonstrate sequence of operation and functions of system devices. Drawings shall include the appropriate sizing of electrical protective devices which are frequently different from National Electrical Code standard sizes.

SD-06 Instructions

Framed Instructions; FIO.

Diagrams, instructions, and other sheets, proposed for posting.

SD-08 Statements

Qualification Certificates; FIO.

Certificates of experience of elevator mechanics employed to install, supervise and test the elevator shall certify mechanics to have not less than 5 years experience installing, supervising and testing elevators of the type and rating specified. Certificate shall certify that elevator system installer is acceptable to elevator manufacturer, prior to installation of elevators.

SD-09 Reports

Testing; FIO.

Test reports in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria, upon completion and testing of installed system.

SD-14 Samples

Finishes; GA.

Samples of materials and products requiring color or finish selection.

SD-18 Records

Test Procedures; GA.

A plan detailing the testing procedures shall be submitted 60 days prior to performing the elevator tests.

SD-19 Operation and Maintenance Manuals

Elevator System; GA.

Six copies of operation manual outlining the step-by-step procedures for system startup, operation and shutdown. Manuals shall include manufacturer's name, model number, service manual parts list and brief description of all equipment, including basic operating features. Six copies of maintenance manual listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. Manuals shall include equipment layout and complete wiring and control diagrams of the system as installed. Operation and maintenance manuals shall be approved prior to training course.

1.3 QUALIFICATIONS

Electric elevators shall be pre-engineered elevator systems, and provided by a company regularly engaged in the manufacture of elevator systems. The manufacturer shall either install the elevator system or provide letter of endorsement certifying that the elevator-system installer is acceptable to the manufacturer.

1.4 REGULATORY REQUIREMENTS

Design and fabrication shall be in accordance with ASME A17.1. Each car shall have the capacity to lift a live load, exclusive of the car and cable at a speed as specified in the following schedule. The approximate travel, terminal floors, number of stops and openings, and the car sizes shall be as shown in the schedule. The elevators shall serve the floors with stops and openings in accordance with the requirements indicated. Passenger elevators shall provide accessibility and usability for physically handicapped in accordance with the requirements for the handicapped in FED-STD 795 and 36 CFR 1191.

1.4.1 Elevator Schedule (Passenger)

Number of Elevators Required:	1.
Type:	Geared.
Service:	Passenger.
Capacity:	1 134 kg (2 500 pounds).
Speed:	1.02 m/s (200 fpm).
Clear Car Inside:	2 032 wide by 1295 deep.

Net Travel:	22 400.
Landings:	[AM#5] 7.
Openings: Front	[AM#5] 7.
Openings: Rear	0.
Entrance Type:	Single speed horizontal sliding; 1 066 mm wide by 2 185 mm high .

1.5 DESIGNATED LANDING

For the purposes of firefighter's service and emergency operations, as required by Section 211, ASME A17.1, the designated landing or level shall be the Ground Level.

1.6 DELIVERY AND STORAGE

All equipment delivered and placed in storage shall be stored with protection from the weather, excessive humidity and excessive temperature variations; and dirt, or other contaminants.

1.7 FIELD MEASUREMENTS

The Contractor shall become familiar with all details of the work, verify all dimensions in the field and advise the Contracting Officer of any discrepancy before performing any work.

1.8 PROTECTION

At time of substantial completion of elevator work (or portion thereof), provide suitable protective coverings, barriers, devices, signs, or such other methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

1.8.1 Temporary Use:

There shall be no use until inspected, tested and certified. Once this has been done, the operating keys shall be turned over to the Government and use of the elevator shall be subject to prior approval by the Contracting Officer's representative and availability of Government inspectors. Do not use elevators for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage. Temporary construction use shall not in any way restrict or limit required warranty.

1.8.1.1 Maintenance Service

Provide full maintenance service by skilled, competent employees of the elevator Installer for elevators used for construction purposes. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use parts and supplies as

used in the manufacture and installation of original equipment.

1.8.1.2 Temporary Protective Measures

Provide protective coverings, barriers, devices, signs, or other procedures to protect elevators. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

1.8.2 Final Protection

Provide final protection and maintain conditions, in a manner acceptable to elevator manufacturer and Installer, that ensure elevators are without damage or deterioration at the time of completion.

1.9 WARRANTY

Warranty service shall be provided for each elevator for a period of 12 months after date of final acceptance by Contracting Officer. Warranty service shall be performed only by trained elevator mechanics during regular working hours, and shall include manufacturer’s warranty requirements including but not limited to adjusting, labor and parts needed to keep the elevator in proper operation. Testing and adjustments shall be in accordance with the applicable provisions of ASME A17.1 and ASME A17.2.1. Emergency callback service shall be included and available 24 hours a day, 7 days per week, with an initial telephone response time of one hour and a response time of 4 hours for a mechanic to the site. Inspection and service for fire service operation, and seismic requirements, shall be performed every 6 months. Documentation of inspection and testing, and certification of successful operation shall be provided with each visit.

PART 2 PRODUCTS

2.1 GENERAL EQUIPMENT REQUIREMENTS

2.1.1 Standard Products

Material and equipment shall be the standard products of manufacturers regularly engaged in the fabrication of elevators and/or elevator parts, and shall essentially duplicate items which have been in satisfactory use for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is available 24 hours a day, 7 days per week, with a response time of 4 hours.

2.1.2 Nameplates

Each major item of equipment shall have the manufacturer’s name, address, type or style, model or serial number, catalog number, and electrical and mechanical characteristics on a plate secured to the item of equipment.

2.1.3 Special Tools

One set of special tools, calibration devices, and instruments required for operation, calibration, and maintenance of the equipment shall be provided.

2.1.4 Electrical Work

Changes to the electrical distribution system required for coordination with elevator equipment shall be performed and coordinated by the Contractor, at Contractor's expense. Electrical service for elevator machines shall be 208 volt, 60-Hertz, 3-phase, 4 wire solid neutral grounded alternating current. The elevator machine feeder for each elevator shall have a circuit breaker or fused disconnect switch located in the elevator machine room, and shall terminate at the control panel for that elevator. Electrical work shall conform to requirements in Section 16415 ELECTRICAL WORK, INTERIOR. A feeder with circuit breaker or fused disconnect switch located in the elevator machine room, shall be terminated at the control panel for each elevator. A telephone junction box and an elevator car lighting junction box shall be provided adjacent to each controller. A single-phase electrical circuit with grounded connection for video monitor shall be provided in machine room. A disconnect switch that will shutoff power to the elevator car lighting shall be provided in the elevator machine room adjacent to the elevator control panel.

2.1.5 Use of Hazardous Products

Materials and products required for manufacturing and installing elevators shall not contain asbestos or other hazardous materials identified by the US Enviromental Protection Agency.

2.1.6 [AM#5] Year 2000 Compliance

All equipment and software shall be Year 2000 compliant and shall be able to accurately process date/time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, including leap year calculations, when used in accordance with the product documentation provided by the contractor, provided that all products (e.g. hardware, software, firmware) used in combination with other information technology, shall accurately process date/time data if other information technology properly exchanges date/time data with it.

2.2 MISCELLANEOUS MATERIALS

2.2.1 Materials for Car Enclosures

Materials for car enclosures shall meet flame spread rating 0 to 75 and smoke development 0 to 450 as tested in accordance with requirements of ASTM E 84 and as established by ASME A17.1, Rule 204.2.

2.2.2 Structural Steel

Structural steel shall be hot-rolled commercial quality carbon steel, pickled, oiled, complying with ASTM A 569/A 569M and ASTM A 568/A 568M.

2.2.3 Cold-Rolled Sheet Steel

Sheet steel shall be cold-rolled commercial quality low-carbon steel, Class 1, exposed matte finish, oiled, complying with ASTM A 366/A 366M and ASTM A 568/A 568M.

2.2.4 Stainless Steel

Stainless steel shall be ASTM A 176 Type 302/304, austenitic, corrosion-resistant with grain of belting in direction of longest dimension. Surfaces shall be smooth and without waves and shall be in

compliance with ASTM A 666 and ASTM A 568/A 568M.

2.3 PASSENGER ELEVATOR CAR

2.3.1 Car Fronts

Fronts for passenger elevators shall be combination door post and return panels manufactured of 1.9837 mm thick stainless steel provided with necessary cutouts for operating devices. Operating panel shall be recessed into front return panel with surface-applied operating panel cover. Position indicator in front return shall be recessed with a surface-applied cover plate. Exposed stainless steel shall be finished with No. 4 Satin Finish, unless otherwise specified.

2.3.2 Car Doors

Car doors for passenger elevators shall be constructed from 1.519 mm sheet steel and stainless steel cladding. Each door shall be sound-deadened and reinforced to receive required operating mechanism and hardware, and have two removable door guides per panel. Seams, screws or binding strips shall not be visible from within the car. Threshold shall be extruded aluminum with grooves for door guides. Exposed steel shall be finished with rust-inhibitive primer and baked-enamel in a color to be selected. Exposed stainless steel shall be finished with No. 4 Satin Finish. Car doors shall be equipped with a proximity-type infrared car door protective device having the following operation:

a. When doors are in full-open position, doors shall be unable to initiate closing if a person comes within the detection zone. The detection zone moves with the doors, so that if a person or object enters the zone after the doors have begun to close, the doors shall stop, then reverse to reopen. The doors shall reclose after a brief time. A passenger entering or leaving the cars shall not cause the doors to reopen unless the doors reach a predetermined proximity to the passenger.

b. After a stop is made, the doors shall remain open for a time to permit passenger transfer, after which they shall close automatically. This time interval shall be less for a car call than for a hall call or a coincident car/hall call.

c. If there is either a hall call anywhere in the group or a car call in the car in question and the doors are prevented from closing for a fixed time period, the door protective device shall be rendered inoperative, a buzzer shall sound in the car and the doors shall close at approximately half speed. Normal door operation shall resume at the next landing reached by the car.

2.3.3 Car Platform

Car platform for passenger elevators shall be fabricated from steel plates secured to a steel frame or plywood secured to a steel frame. Steel car platforms shall be assembled into a one-piece platform with top and bottom steel plates welded to structural steel frame and covered with felt and sound-isolation. Plywood car platform shall be 18 mm thick Exposure 1 plywood secured to structural steel frame with metal fire protection secured to underside of structural steel frame.

2.3.4 Walls

Walls for passenger elevators shall be 2426 mm) high from floor to the underside of lighting fixtures. Side and rear panels shall be 1.519 mm thick sheet steel panels. Side and rear removable panels shall be applied to car walls and shall be manufactured from 18 mm plywood or composition board finished on front, back and edges faced with plastic laminate conforming to NEMA LD 3, general purpose type. Panels shall be mounted on car walls in a manner permitting their reversing. Panels shall be evenly spaced with not less than two panels on each side and three panels at the rear with reveal standard with manufacturer. Vent around base shall be concealed behind removable panels.

2.3.5 Car Top, Ceiling and Light Fixtures

Car top for passenger elevators shall be manufactured from 2.657 mm thick sheet steel and shall be not less than 140 mm high with drop-ceiling and light fixtures. Ceiling shall be egg crate white plastic fire-retardant light diffuser supported by polished aluminum perimeter frame and dividers to form the drop-ceiling light fixture. Light fixtures shall be fluorescent type, flush with car ceiling, manufactured of sheet steel with flange and enclosed sides and top, baked-enamel reflector, mounted directly to outlet box. Bottom of fixtures shall be flush with car ceiling. Fluorescent light fixtures shall be dual lamp with quick-starting high-power factor, Class P ballasts, with safety lamp guard clamps on fluorescent tubes. Light level shall average at least 108 lx measured at the car threshold with the door closed. Part of car light fixture shall be removable to permit use of the emergency exit in top of car.

2.3.6 Emergency Exit

Car top for passenger elevators shall be manufactured with a hinged emergency exit panel of 2.657 mm thick steel which opens up to clear the crosshead and car door operator. Emergency exit panel shall be hinged and held in place with nonremovable fastening devices at each corner, and manually openable from top of car and key-operable from inside. A minimum of 2 sides of exit panel shall lap the exit opening by 25 mm. Exits shall be equipped with electrical contacts which will prevent operation of car when exit door is open and cause the alarm bell to ring.

2.3.7 Floor Finish

Floor finish for passenger elevators shall be finished with [AM#5] broadloom carpet as specified in Section 09680 CARPET. Carpet shall be laid flush with the extruded aluminum platform threshold.

2.3.8 Base

Base for passenger elevators shall be cove type stainless steel, 150 mm high.

2.3.9 Handrails

Handrails for passenger elevators shall be mounted on each wall and shall comply with ASME A17.1, FED-STD 795 and 36 CFR 1191.

2.3.10 Exhaust Fan

Exhaust fan for passenger elevators shall be 2-speed exhaust type ventilating unit mounted in car ceiling and shall be provided with a

stainless steel grille. Units shall be suitably isolated from car ceiling and shall provide at top speed a minimum of 6 air changes per hour for car volume and car occupancy. Switches for the operation of exhaust unit shall be located in car station locked cabinet or key-switched.

2.3.11 Communications

A telephone system in stainless steel cabinet shall be provided for passenger elevators. A vandal-resistant speaker type intercom with push-button to activate shall be installed in car station behind a stainless steel perforated grille and connected to a programmable auto-dialer located in machine room. Auto-dialer shall be provided with a solid-state charger unit which will automatically provide emergency power and an immediate transfer in the event of failure of normal power supply. The push-button located in the car station or in separate cabinet shall be at the prescribed handicapped height and shall be identified as "Emergency Phone (Push to Activate)". The entire communication assembly shall be approved for an elevator installation. The telephone communication shall not be terminated until one of the communicating parties hangs up the receiver or manually disconnects the communications link.

2.3.12 Car Emergency Lighting System

Emergency car lighting system for passenger elevators shall consist of an emergency power pack on top of elevator and a remote lighting fixture inside elevator car located above car operating panel.

2.3.12.1 Power Pack

Power pack for car emergency lighting system shall be sealed lead-cadmium or nickel-cadmium 6-volt rechargeable batteries with solid-state controls and an integral regulating charger connected to normal power supply. Power pack unit shall contain the following:

a. Minimum 150 mm diameter alarm bell connected to the elevator alarm and emergency push-button.

b. Top of car light fixture with protective wire guard.

c. Testing circuit and pilot light.

d. Low-wattage pilot light indicator.

e. Battery low-voltage disconnect.

2.3.12.2 Emergency Light Fixture

Emergency light fixture for passenger elevators shall be located in car station inside elevator car, with flush-mounted lens and shall consist of the following:

a. A minimum of two lamps capable of providing a minimum level of illumination of 10.8 lx at a point 1 220 mm above the floor, 300 mm in front of car station.

b. Fixture frame of stainless steel .

c. Frosted acrylic lenses, 6 mm thick.

2.3.12.3 Remote Light Fixture

Upon interruption of normal power, remote light fixture for passenger elevators shall automatically and immediately illuminate and permit operation of the bell, subject to the activation of the emergency stop-switch or alarm button. Emergency power pack shall be capable of providing a minimum of 1 hour emergency bell operation and 4 hours of continuous illumination.

2.3.13 Top of Car Controls

The top of the elevator car must have an operating device to allow slow speed movement of the car.

2.3.14 Protection Pads

Passenger Elevator: Car shall be provided with wall protection pads, with inconspicuous stainless steel pad hooks spaced not over 460 mm apart near ceiling. Pads shall be heavy quality fire-retardant treated canvas with two layers of sewn cotton batting with metal eyelets for each pad hook. Pads shall cover the entire wall surface except operating devices.

2.3.15 Certificate Frame

A stainless steel certificate frame with translucent plexiglass lens of the appropriate size to receive certificate issued by inspecting agency shall be provided for passenger elevators. Frame shall be engraved to show name of elevator manufacturer, carrying capacity in kilograms (pounds) and maximum number of persons allowed.

2.3.16 Car and Counterweight Guides and Guide Shoes

Roller guides shall consist of minimum 3 tires mounted on top and bottom of car and counterweight frame. Roller guides shall be held in contact with guide rail by adjustable devices and shall run on dry, unlubricated rails.

2.3.17 Car Guide Rails

Guide rails for passenger elevator shall be planed steel tee or omega shaped sections with structural channel rail backing as required, tongue-and-groove matched joints reinforced with fitted splice plates. Guide rails shall extend from bottom of pit to underside of roof over hoistway.

2.4 PASSENGER ELEVATOR HOISTWAY ENTRANCES

2.4.1 Hoistway Doors

Hoistway doors for passenger elevators shall be designed and fabricated as part of a Class B 1-1/2 hour fire-rated door/frame assembly to meet requirements of NFPA 252 and shall bear the label of an approved testing laboratory. Door panels shall be hollow metal type with plain panel design, not less than 32 mm thick with 1.519 mm thick face sheet-steel and stainless steel cladding with 1.519 mm thick sight guards. Each door shall be reinforced with continuous vertical members and filled with sound-deadening material. Doors shall be reinforced to accept the required operating mechanism and hardware. Doors shall have 2 removable door guides per panel. Seams, binding strips or screws shall not be visible from landing. Exposed steel shall be finished with rust-inhibitive primer and

baked-enamel in a color to be selected, unless otherwise specified. .

2.4.2 Hoistway Frames

Hoistway frames for passenger elevators shall be designed and fabricated as part of a Class B 1-1/2 Hour fire-rated door/frame assembly to meet requirements of NFPA 252 and shall bear the label of an approved testing laboratory. Frames for passenger elevators shall be formed 1.897 mm thick sheet-steel with head and jamb in flush alignment and corners welded and ground smooth. Head and jamb section shall be bolted assembly with bolts, washer and locking nut or lock washer. Frame assembly shall be securely fastened to structure. Frames shall return to wall. Combination buck and jamb frames may be provided with knockdown back flanges to permit installation in concrete walls. Exposed steel shall be finished with rust-inhibitive primer and baked-enamel in a color to be selected, unless otherwise specified.

2.4.3 Symbols

Raised stainless steel symbols as required by FED-STD 795 and 36 CFR 1191 of color selected, shall be provided for passenger elevators at each floor to indicate the floor location. Symbols shall be attached with concealed fasteners. Symbols shall be placed in a location which can be seen by passengers from the opened passenger doors.

2.4.4 Sills

Sills for passenger elevators shall be extruded aluminum with slip-resistant surface and machined grooves for door guides, secured to floor beams.

2.4.5 Strut Angles

Strut angles for passenger elevators shall be structural steel of size not less than 76 x 76 x 5 mm extending from sill to beam above and anchored to building structure with structural steel fastenings and bracings of structural members with a cross section of not less than strut angles.

2.4.6 Door Hangers and Housing

Each door panel shall be provided with not less than 2 sheave-type hangers designed for required door operation. Hanger housing and support shall be fabricated from formed Z-shaped steel angles of size not less than 5 mm thick bolted to strut angles.

2.4.7 Door Rollers

Door rollers shall be constructed with grease-packed ball-bearings and shall be tired with a sound-reducing material. Diameter of rollers shall be not less than 83 mm for car doors and not less than 57 mm for hoistway doors. Upward thrust shall be taken by a hardened and ground ball-bearing roller assembled on an eccentric stud to provide adjustment.

2.4.8 Hanger Track

Hanger track shall be of high carbon cold-drawn steel, round at top to receive door rollers, and round at bottom to receive up-thrust rollers, of size engineered to accommodate load requirements.

2.4.9 Covers and Guards

Hanger covers, dust covers, toe guards, and fascia plate shall be fabricated from 1.579 mm thick reinforced steel and finished with baked-enamel. Hanger covers shall extend the full door travel and shall be mounted in sections for ease of servicing door hangers. Dust covers shall be provided over top terminal landing door only and shall be secured to hanger housing and building structure. Toe guards shall be secured to sill. Fascia plates shall be provided between each door hanger housing and sill.

registered. Buttons shall be designed with 0.8 mm operating clearance to seat on faceplate in lieu of the button mechanism. Buttons shall have maximum protrusion of 5 mm beyond the faceplate and shall have beveled edges to prevent damage from side blows. Buttons and switches not required for automatic or fire service operation shall be key-operated and mounted on front-return car operating station. Elevator number and "NO SMOKING" shall be international symbol engraved on upper portion of car station. Operating panel in the car shall consist of a flush-mounted panel containing the following operating devices:

a. "DOOR OPEN" button.

b. "DOOR CLOSE" button.

c. Key-operated car fan/light switch.

d. Key-operated ventilating blower switch/call-light.

e. Communication speaker phone, grille and push-to-call button .

f. Emergency stop switch when operated will stop the car independently of normal stopping devices. Operation of emergency stop switch shall not cause any power variance or surge that may affect the operation or condition of the control panel or its components.

g. Emergency signal-switch connected to a 150 mm diameter signal bell outside of elevator hoistway at Ground Level and Eighth Level located as shown or as directed.

i. Key-operated inspection switch which will render normal operation inoperative for the purpose of using the hoistway access switch.

j. Key-operated fire service switch and light jewel.

2.6.3 Hall-Call Station

Hall-call operating devices for passenger elevators at landing shall consist of an "UP" push-button at bottom landing, a "DOWN" push-button at top landing and "UP" and "DOWN" push-buttons at all other landings. Push-buttons shall be vandal-resistant, metal encased and back-lighted to permit illumination when a call is registered. Buttons shall be designed with 0.8 mm operating clearance to seat on faceplate in lieu of the button mechanism. Buttons shall have maximum protrusion of 5 mm beyond the faceplate with beveled edges to prevent damage from side blows.

2.6.3.1 Fire Service Switch

Fire service switch for passenger elevators shall be located at the designated landing.

2.6.4 Direction Lanterns

Lanterns for passenger elevators shall be in accordance with FED-STD 795 and 36 CFR 1191, and shall be provided in each car entrance column. Lanterns shall be vandal-resistant design.

2.6.5 In-Car Position Indicator

Indicator numerals and directional arrows for passenger elevators shall be flush-mounted faceplate with black-filled engraved numerals not less than 25 mm high and 10 mm diameter vandal-resistant light jewels directly beneath each number. As car travels through hoistway the car position shall be indicated by illumination of light jewel corresponding to landing at which the car is stopped or passing. Necessary light baffles shall be provided. Floor numerals and letters shall illuminate white. A position indicator of the digital-readout or dot-matrix type (minimum 50 mm high indication) shall be provided in car transom panel. Number corresponding to car position shall remain illuminated when motor drive is shut down. Illumination shall be shrouded in an approved manner to protect against glare from car lighting.

2.6.6 Audible Signals

An audible signal shall be provided at each floor landing and in each car and shall sound coincident with the lantern illumination indicators. The audible signal shall be no less than 20 decibels with a frequency no higher than 1500 Hz. The audible signal shall sound once for UP direction and twice for DOWN direction.

2.6.7 Combination Hall-Position Indicator and Directional Arrows

A digital-readout position and direction indicator (minimum 50 mm (2 inch) high indication) for passenger elevators shall be provided over each entrance. As elevator travels in hoistway, elevator position shall be indicated by illumination in alpha-numeric characters corresponding to the landing where elevator is stopped or passing. Number corresponding to position of car shall remain illuminated when the motor drive is shut down. An audible signal shall sound in the elevator car to indicate that the elevator car is stopping or passing a floor served by elevator. Fixture design and operation shall be similar in design to that specified for Car Position Indicator.

2.7 PASSENGER CAR OPERATION (SINGLE-CAR SELECTIVE/COLLECTIVE)

Passenger Elevator: Car shall be arranged so that by pressing one or more car buttons the car will start automatically and stop at first floor for which the button has been pressed corresponding to the direction in which the car is traveling. Car shall stop in the order in which floors are reached by car at all floors for which calls have been registered, irrespective of the sequence in which buttons have been pressed, provided the button for a given floor has been pressed sufficiently in advance of car’s arrival at that floor to permit the stop to be made. If car buttons have not been pressed, and car starts UP in response to several DOWN calls, car shall travel to highest DOWN call first and then reverse to collect other UP calls. UP calls shall be collected in the same way when car starts DOWN in response to UP calls by first stopping for the lowest UP call registered. When a car has stopped in response to the pressing of a landing button and a car button is pressed corresponding to the direction in which the car has been traveling, within a predetermined interval of time after the stop, car shall continue in that direction regardless of other landing calls registered. While car is in motion, landing calls in the opposite direction of car movement shall not affect operation of car but calls shall remain registered. After the last car call in the direction the car is traveling has been answered the car shall automatically reverse and answer registered landing calls and all car calls in the order the landings are reached. When all calls have been answered, the car shall stop at the last floor served and shall have the doors closed.

2.8 AUTOMATIC EMERGENCY POWER OPERATION

Elevator control system shall be arranged to operate on emergency power supply upon failure of the normal power supply. Elevators operating on dedicated service, such as fire service, will not be required to return to the designated landing when emergency power becomes available for respective elevator. Elevators shall operate as follows:

a. When normal power supply fails, all cars shall shut down.

b. One car shall automatically start and travel at full-rated speed to the designated landing stop, open the car and hoistway doors and then shut down.

d. After car has moved to the designated landing car shall operate at rated speed to serve car and landing calls. Automatic selection can be overridden manually. Emergency power selector buttons and light jewels shall be provided in a stainless steel faceplate at the designated landing. Emergency power selector buttons shall be operable after automatic return has been completed.

2.9 AUTOMATIC ELEVATOR OPERATION

2.9.1 General

The operating device shall consist of a series of push-buttons in car numbered to correspond to various landings, "UP" and "DOWN" buttons at intermediate landings, and a single button at terminal landing. To meet the elevator operation requirements specified in this section, all buttons shall be connected electrically to the control system which governs the floor selection, car selection, direction of travel and governs the acceleration and retardation.

2.9.2 Operation

Car calls shall be registered within the car by pressing the button corresponding to the designated floors. Hall calls shall be registered by pressing buttons in the corridor push-button fixture. Once the demand for elevator service has been established and the car has received a start signal the car operation shall be as follows.

2.9.2.1 Door Closing

Doors shall close automatically. When doors are fully closed and the interlock circuit established, the car shall start to move in the direction established by control system. Car shall accelerate and decelerate automatically and stop at first floor for which a car button has been registered or at the first floor for a corridor demand which has been assigned to car. Car shall stop at all floors for which car calls are registered in the order in which the floors are reached and shall stop for any corridor demands assigned to the cars in the order in which the floors are reached.

2.9.2.2 Door Opening

Doors shall open automatically as car reaches the landing. After a predetermined time the doors shall close and the car shall proceed to answer the remaining car or assigned corridor calls. A protective device

such as a safety edge and light beam device shall be provided on car door and when activated will prevent closing of doors. Cars shall become available for assignment at whatever floor the last car demand has been satisfied in the direction in which car is traveling.

2.9.2.3 Car Dispatch

When car does not receive a demand dispatch at dispatching floor for an adjustable time period up to 10 minutes set initially at 5 minutes, the motor drive unit shall be switched off. If the car's switched-off motor drive unit receives a demand dispatch the motor drive unit shall automatically restart.

2.9.2.4 Door Dwell-Time

Door open dwell-times shall be adjustable so that the open time for a car call is shorter than the open time for corridor calls and second passengers. If a longer time is needed for passenger entry, doors can be prevented from closing or reversing by the light beam door control, the protective leading edge on car door, or by pressing "DOOR OPEN" button in car. Door dwell-times shall comply with FED-STD 795 and 36 CFR 1191.

2.9.3 Automatic Load Weighing

Passenger elevators shall be provided with load-weighing devices which will cause elevator to bypass hall calls when elevator is filled to an adjustable percentage. Corridor calls shall remain registered until the next available car responds to the call.

2.9.4 Anti-Nuisance

Passenger elevators shall be provided with a system which will cancel all car calls in the event that between 3 and 5 times the number of car calls are registered as there are passengers in car, allowing 70 kg per passenger.

2.9.5 Door Operation

Double-door operation shall not be permitted for passenger elevators. If an UP traveling car has a passenger for an intermediate floor and a DOWN call is registered at that floor with no-calls above car, the car shall travel to floor, open the door and let passenger out, then light the DOWN direction arrow in hall lantern and accept the waiting passenger who registered the DOWN call. Doors shall not perform the open-close cycle before elevator proceeds to next call.

2.9.6 Automatic Power Shutdown Upon Fire Sprinkler Activation

Elevator control system shall cause automatic power shutdown of the elevators in the event that a heat detector or sprinkler head located in the elevator machine room or in the elevator hoistway activates. Heat detector shall be fixed-temperature-rate-of-rise type, rated at 57 to 60 degrees C. Activation of a heat detector or a waterflow switch, which monitors only the sprinkler heads in the elevator machine room and in the hoistway, shall cause the following operations to the affected elevators:

a. Elevators which are in motion will proceed to the nearest available landing away from the fire floor, and shall cause power-operated doors to open and remain open. The fire floor is considered the

floor where the fused sprinkler head or heat detector is located.

b. Elevators which are standing at a landing with open doors will remain open at the floor. If power-operated doors are closed, the elevator will cause the doors to open.

c. Power to the elevators will be automatically shutdown by operating the shunt-trip breaker(s) in main line power supply. Shutdown will occur only after the elevators are stopped at a landing, and power-operated doors are opened.

d. Automatic shutdown will override Phase I Emergency Recall Operations, ASME A17.1, Rules 211.3a and 211.3b, but will not override Phase II Emergency In-Car Operation, ASME A17.1, Rule 211.3c if Phase II operation is in effect.

2.9.7 Automatic Operation Upon Smoke Detector Activation

Elevator control system shall cause automatic operation upon smoke detector activation shall conform with Smoke Detectors ASME A17.1, Rule 211.3b.

a. The activation of a smoke detector in any elevator lobby, other than at the designated level, shall cause all cars that serve that lobby to return nonstop to the designated level. The activation of a smoke detector in any elevator hoistway shall cause all elevators having any equipment located in the hoistway to return nonstop to the designated level, except that smoke detectors in hoistways installed at or below the lowest landing of recall, when activated, shall cause the car to be sent to the upper level of recall. The operation shall conform to the requirements of ASME A17.1 Rule 211.3a.

b. When the smoke detector at the designated level is activated, the operation shall conform to the requirements of ASME A17.1 Rule 211.3a, except that the cars shall return to an alternate level approved by enforcing authority, unless the designated-level three-position Phase I switch is in the "ON" position.

c. The activation of a smoke detector in any elevator machine room, except a machine room at the designated level, shall cause all elevators having any equipment located in that machine room, and any associated elevators of a group automatic operation, to return nonstop to the designated level. The activation of a smoke detector in any elevator machine room at the designated level shall cause all elevators having any equipment located in that machine room to return nonstop to the alternate level, or the appointed level when approved by the authority having jurisdiction.

d. Elevators shall only react to the first smoke detector zone which is activated for that group.

e. Phase I operation, when initiated by a smoke detector, shall be maintained until canceled by moving the Phase I Switch to the "BYPASS" position. Smoke detectors and/or smoke detector systems shall not be self-resetting.

f. Coordinate with requirements of Section 13851 FIRE DETECTION AND ALARM SYSTEM, ADDRESSABLE.

2.10 FIREFIGHTERS' SERVICE

Firefighter service shall be in accordance with ASME A17.1 for automatic elevators. Elevator lobby and machine room smoke detectors shall be in accordance with Section 13851 FIRE DETECTION AND ALARM SYSTEM, ADDRESSIBLE.

2.11 ELEVATOR MACHINE (GEARED)

2.11.1 Hoisting Machine

Machine shall be worm-geared traction type with motor, brake, worm gearing, traction sheave and bearings mounted on common bed plate. Worm shall be of steel and integral with the worm shaft and shall be provided with a ball-thrust bearing with self-alignment blocks or preloaded thrust bearing designed to take the end thrust of the worm in both directions. Main gear shall be hobbed from a bronze rim accurately fitted and bolted to gear spider. Gears shall be fitted to minimize the noise, vibration and wear. Roller bearings shall be complete with drive sheave shaft and provisions for lubrication. Design and construction of equipment and parts subject to wear shall be completely repairable and replaceable.

2.11.2 Hoisting Ropes

Hoisting ropes shall be the independent wire-rope type, regular lay, preformed, non-coated, improved plow steel of 6 x 37 construction. Hoisting ropes shall be suited for service requirements to be provided. Hoisting rope connections shall be by tapered babbitted socket connections and shall be rated in strength equal to or greater than the strength rating of the rope. Hoisting ropes shall be selected so that the rated capacity load plus the load block weight divided by the number of parts of rope will not exceed 20 percent of certified breaking strength of rope. Hoisting ropes shall be secured to the hoist drum so that no less than two wraps of rope remain at each anchorage of hoist drum at extreme low position.

2.11.3 Sheaves

Drive sheave shall be steel or semi-steel finished with grooves to receive hoist ropes and shall give maximum traction and minimum wear. Grooved nonmetallic inserts on drive sheave may be provided at Contractor's option. Deflector and overhead sheaves, suitable sheet metal guards with required service openings, sheave beams and supports shall be provided as required.

2.11.4 Hoist Motor (Geared)

Motor shall be a geared type, direct-current for variable voltage with Class B insulation, designed for elevator service to develop the required high-starting torque with low-starting current in accordance with NEMA MG 1. Motor shall be designed to meet requirements of elevator service and be capable of starting cold and carrying the full-rated load in car for a period of 1 hour of continuous UP and DOWN runs, stopping at all floors and standing not more than 10 seconds at each floor without overheating. Speed regulation of the car, with full-rated load shall not exceed plus or minus 5 percent of average on a round trip.

2.11.5 Armature

Armature shall be electrically balanced and the armature and brake drum shall be mechanically balanced as a unit. Field coils shall be spool or form wound. Windings in both armature and field shall permit easy removal.

2.11.6 Commutator

Commutator and brushes shall be of sufficient size, area and designed to perform under full-load with sparks barely visible and without overheating. Brushes shall have individual tension adjustment with provisions for adjusting and positively locking the brush holder in place as a unit.

2.11.7 Brake Assembly

Brake shall be spring-applied, electrically released and designed for automatic application in the event of interruption of power supply. Brake drum shall have a wearing surface and edge of flange turned smooth and wearing surface shall run within a maximum variation of 0.13 mm. Brake shoes shall be lined with a fireproof friction material shaped to shoes so that the drum will run free with normal clearance. Brake springs shall be helical and operated in compression and shall apply the brake when released by the magnet. Brake magnet shall be designed to release quickly. The brake application shall be automatically controlled by magnetic retardation to obtain noiseless, smooth and gradual stops under all loading conditions. Release magnet coil circuit shall be opened by the various safety devices, power failure, failure of equipment to function in the proper manner for safe operation of car and upon normal stopping of the car.

2.11.8 Bed Plate

Bed plate shall be cast iron or steel in one piece with stiffening ribs to accurately maintain alignment of parts or be heavy rigid structural steel shapes securely welded together. Pads accurately planed or milled shall be provided as seats for parts secured to bed plate.

2.12 SOUND AND VIBRATION ISOLATION

Sound and vibration isolating foundation shall effectively prevent the transmission of machine vibration and sound to building structure. Location and deflection characteristics of isolation units shall produce a uniform and nonexcessive loading on units under all operating conditions.

2.13 VARIABLE VOLTAGE CONTROL

2.13.1 Performance

Control system shall govern the starting, stopping and direction of travel of elevator and provide the operation specified. Control shall be accomplished by an individual generator or solid-state motor control for each elevator where the voltage applied to hoist motor is variable. Control equipment shall be of type suitable for motors and type of operation specified to provide smooth acceleration from stop to full speed, deceleration and landing stops under any load condition from no load to full-rated load. Maximum time from start of car motion to floor level at the next floor for geared machines shall be 20 seconds for a speed of 1.02 m/s. Time from door close to start of car motion shall not exceed 0.7 second with a balanced load. Cycle time, which is the time from start of door close to door fully open at the next typical floor, shall not exceed 30 seconds. Prior to the termination of maintenance period included in the Base Contract, elevators shall be readjusted as required to meet performance requirements. All performance times specified in this section are based on 3 200 mm floor height, and 1 066 mm wide single-speed slide doors.

2.13.2 Controller

Electric controller shall be microprocessor-based logic type with battery backup system with charger and charge time for a depleted battery, battery reserve and a low-voltage disconnect. Components required for proper performance of elevator shall be neatly mounted and wired and completely enclosed in a cabinet with a mechanically-latched door.

2.13.3 Motor Generator Set

Elevator control shall be effected by means of a uniformly varying dc voltage applied to elevator motor. An individual motor generator set shall be provided for each elevator.

2.13.3.1 Vibration Isolators

Generator set shall be located in elevator machine room and provided with a vibration-isolated foundation or a vibration-absorbing device which shall be effective in preventing the transmission of vibration to building structure.

2.13.3.2 Mounting

Motor generator shall be compact in design with all units mounted on same rigid cast iron or structural steel bed plate. Motor and generator units shall be mounted on a single rigid steel shaft.

2.13.3.3 Start Sequence

Motor generator set shall start automatically by registration of a car or landing call and shall stop automatically in a predetermined time adjustable from 1 to 12 minutes after all calls have been answered. Motor generators shall be arranged for sequence starting to prevent more than one motor generator from starting simultaneously.

2.13.3.4 Duty Rating

Design of apparatus shall be in accordance with the NEMA MG 1 specifications for 50 degrees C temperature rise, continuous-duty rating and IEEE Std 304 rules for Class A insulation and 50 degrees C continuous operation.

2.13.3.5 AC Contacts

Main ac contacts on starting panel shall be copper to carbon. Contacts breaking the main ac line current shall be provided with magnetic blow-outs.

2.13.3.6 Commutator

Sparks from the commutator shall be barely visible when elevator is accelerating or retarding from full-speed with a load in car ranging from no-load to full-load.

2.13.3.7 No-Load Speed

The no-load synchronous speed of motor generator set shall not exceed 1800 rpm. Proper direction of rotation shall be indicated by an arrow on frame.

2.13.3.8 Bearing Lubrication

Bearings shall be anti-friction bearing metal type with oil reservoirs, automatic self-lubrication and gauges, or of the ball-bearing type arranged for grease lubrication and fitted with grease connections.

2.13.3.9 Automatic Remote Control Starting Panel

Automatic remote control starting panel shall contain the necessary switches and overload devices. Starter may be separate or be incorporated in controller.

2.13.4 Solid-State Motor-Control

A solid-state motor-control unit shall be provided for each elevator, with electrical characteristics suitable to the available distribution system. The system shall consist of necessary 3-phase, full-wave bridge rectifiers or other devices and shall be full regenerative. A Transient Voltage Surge Suppressor (TVSS) device shall be provided to protect the solid-state motor-control unit and other electronic equipment in the facility. Solid-State control unit shall have the capacity to handle peak currents and shall contain a balanced and coordinated fault-protection system to protect the unit as follows:

a. Protection system shall protect complete power circuit (specifically the power semi-conductors) from failure under short circuit conditions.

b. Protection system shall protect unit from faults arising from partial grounds, partial shorts in motor armature, or in power unit.

c. Protection system shall protect drive motor against sustained overloads using a solid-state overload circuit.

d. Protection system shall protect motor and power unit against instantaneous peak overload.

e. Protection system shall protect phase sequence to ensure incoming line is phased properly.

f. Protection system shall protect unit against instantaneous overcurrent.

g. Protection system shall protect unit against low power line voltage (less than 75 percent of nominal).

h. Protection system shall protect unit against blown ac input fuse and blown dc converter output fuses.

i. Protection system shall protect against excessive converter output voltage and excessive open-circuit voltage, and heat dissipation device.

j. The Transient Voltage Surge Suppressor (TVSS) device used to protect the solid-state motor-control unit shall be listed by UL 1449 and tested by manufacturer to meet requirements of IEEE C62.11, IEEE C62.41 and IEEE C62.45 Categories A, B and C. The system shall be connected in parallel with the protected system; series-connected elements which could constitute a single-point

failure shall not be used. The protection modes for the TVSS device shall have as a minimum line-to-ground, neutral-to-ground, line-to-neutral and Delta Systems line-to-line. The TVSS surge current capacity, based on an 8 x 20 micro-second waveform, shall be a minimum of 75K amps per phase. The maximum UL 1449 clamping voltage for each protection mode shall not exceed 800 volts for 208, 240 and 277/480 volt system. The TVSS system shall provide a joule rating that meets or exceeds the requirements of IEEE C62.41 Category C delivery capability. The TVSS system shall provide a noise-attenuation of 40 db for electrical line noise. The TVSS system shall be a symmetrically balanced metal oxide varistor (MOV) array system, constructed with surge current diversion modules each capable of withstanding 25 KVA surge current based on standard 8 x 20 micro-second waveform. Each module shall be capable of withstanding over 1000 pulses of 10K amps in accordance with IEEE C62.41 Category C surge current without degradation of clamping voltage. The module shall consist of multiple gapless metal oxide varistor individually fused. Gas tubes or silicon avalanche shall not be used. When module performance is degraded, as if one or more fuses or varistors have failed, a light emitting diode (LED) indicator shall indicate a failed module.

2.13.4.1 Fault Conditions

Occurrence of any of the above fault conditions shall result in the immediate removal of the drive’s run command, the clamping of the internal current regulator, the opening of armature loop and an emergency dynamic brake stop. Drive system shall also notify the car controller of shutdown via a drive status signal. Car controller shall respond to continuous-drive reset pulses which shall reset the drive as soon as fault condition clears, if it is not a hard failure such as blow fuse, and shall return elevator to service. The dc direct-drive system shall be designed to include input impedance to filter out electro-mechanical noise on SCR drive system.

2.14 SENSOR AND CONTROL WIRING SURGE PROTECTION

Digital and analog inputs shall be protected against surges induced on control and sensor wiring. Digital and analog outputs shall be protected, as shown against surges induced on control and sensor wiring installed outdoors. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following two waveforms:

a. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.

b. An eight microsecond rise time by 20 microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes.

2.15 COMMUNICATIONS LINKS SURGE PROTECTION

Communications equipment shall be protected against surges induced on any communications link. Cables and conductors, except fiber optics, which serve as communications links from motor control room (MCR) to field equipment, and between field equipments shall have surge protection circuits installed at each end. Protection shall be furnished at equipment and additional triple electrode gas surge protectors rated for the

application on each wireline circuit shall be installed within 1 m of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following two waveforms:

a. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.

b. An eight microsecond rise time by 20 microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes.

2.16 COMMUNICATIONS LINKS OVER VOLTAGE PROTECTION

Communications equipment such as MODEMs, line drivers, and repeaters shall be protected against overvoltage on communications link conductors. Cables and conductors, which serve as communications links, except fiber optics, shall have overvoltage protection for voltages up to 480 Vac rms, 60 Hz installed. Instrument fuses or fusible resistors are required for this application.

2.17 COMPENSATION

2.17.1 Solid-State Control with Integral Compensation

Solid-state control compensation up to and including 45 m of travel for 1:1 roping, or 40 m of travel for 2:1 roping shall be provided.

2.18 COUNTERWEIGHT

Counterweight for each car shall equal the weight of car plus approximately 40 percent of specified load. Concrete weights are not acceptable. Counterweight screen of metal construction, at least 2 m high, shall be provided as a protective guard at bottom of hoistway, except where the type of hoisting rope compensation prevents this type of installation.

2.19 LEVELING DEVICES

Elevators shall be equipped with a 2-way leveling device to automatically bring the car to the floor landings. Car shall automatically relevel at each landing to correct overtravel and undertravel, and maintain the level regardless of load on the car, rope slippage or stretch of cables. Electric stopping system shall be arranged so the car will stop level with the floor before brake is set. Stopping accuracy shall not exceed plus or minus 6 mm.

2.20 LUBRICATION POINTS

Every part subject to movement friction shall be complete with provisions for oil and grease lubrication.

2.21 SEISMIC REQUIREMENTS

Seismic protection shall be provided to conform to ASME A17.1, Rule XXIV.

2.22 PIT STOP SWITCH

Provide pit stop switch in compliance with ASME A17.1, Section 106.1f.

PART 3 EXECUTION

3.1 INSTALLATION

Elevators and equipment shall be installed in accordance with ASME A17.1 and manufacturer's recommendation. Guide rails shall be set plumb and parallel and attached to guide rail brackets secured to building framing as indicated and at intervals not exceeding 3 200 mm. Steel plate shims shall not be used for aligning equipment. Guide rail sections shall be joined rail sections, joined together in accordance with ASME A17.1. Guide rails shall be thoroughly cleaned and made smooth before elevator is put into operation. During installation stainless steel surfaces shall be protected.

3.2 FIELD WELDING

When structural or load-bearing members are to be field-welded, welding and qualification of welders shall be as specified in Section 05090 WELDING, STRUCTURAL.

3.3 ELEVATOR WIRING

Wiring shall be provided for electrically-operated items of elevator equipment to comply with requirements of NFPA 70 and Section 16415 ELECTRICAL WORK, INTERIOR. For control and signal circuits wire shall be minimum No. 16 AWG. For power and lighting circuits wire shall be minimum No. 12 AWG. A work light fixture equipped with 150 watt incandescent lamps and ground duplex receptacles shall be provided at both the top and bottom of the car. Work light fixtures and traveling cable junction boxes shall be located to provide illumination at junction boxes. Wiring shall terminate in junction boxes. Wires shall be identified and match symbols shown on wiring diagrams. Control and signal wires shall be brought to accessible numbered terminal blocks on controller. Intra-panel wiring shall be flame-resisting type.

3.3.1 Traveling Cables

Cables shall terminate at numbered terminal blocks in car and machine room. Traveling cable shall be provided with a separate shielded circuit for communication system and hang to obtain proper size of loop. Traveling cable shall be provided with 10 percent spare conductors for each car.

3.4 PAINTING

Except for factory finished items and corrosion-resistant items, machined surfaces shall be painted as specified in Section 09900, PAINTING, GENERAL.

3.5 TESTING

Testing shall be in accordance with requirements of ASME A17.1 and ASME A17.2.1 and as specified below. Contractor shall conduct a complete test of the system. After the system has passed all tests, the Contractor shall notify the Contracting Officer in writing, 14 days prior to the time of performing the acceptance test, that the system is complete and is ready for final acceptance testing. The Contractor after receiving written approval from the Contracting Officer will conduct a complete acceptance test of the system. The Contractor shall provide the services of an elevator inspector, employed by an independent testing company to inspect the elevators, witness the acceptance testing and certify the elevators.

The inspector shall meet all qualification requirements of ASME QEI-1 and shall be certified in accordance with ASME QEI-1. The Contractor shall provide an elevator certificate signed by the inspector for each elevator. The certificate shall be provided to the Contracting Officer within 30 days after completion of all testing.

3.5.1 Testing Period

Each elevator shall be tested with the specified rated-load in car continuously for a period of 35 percent of the duty time. During the test run the car shall be stopped at all floors in both directions of travel for a standing period of 10 seconds per floor. A manual test of the final limits (UP and DOWN overtravel) shall also be performed.

3.5.2 Speed Load Testing

The actual speed of elevator car in both directions of travel shall be determined with the rated-load and with no-load in the elevator car. Actual measured speed of car with the rated-load in the UP direction shall be within 5 percent of rated speed. The maximum difference in actual measured speeds obtained under the various conditions outlined shall not exceed 10 percent of the total difference between the UP and DOWN speeds.

3.5.3 Car Leveling Testing

Elevator cars leveling devices shall be tested for accuracy of landing at all floors with no-load in car, with symmetrical load in car and with the rated-load in car in both directions of travel.

3.5.4 Brake Testing

Brake test shall be conducted with the rated-load in the car. Brakes shall stop and hold the car with the rated-load. In elevators using a Ward-Leonard type generator drive system it is critical to test the suicide circuit to assure that loop currents cannot cause the hoist motor to pull through the brakes.

3.5.5 Temperature Rise Testing

Temperature rise of hoistway motor, motor drive, exciter and booster shall be conducted during the full-load test run for minimum one hour. Under these conditions the temperature rise of equipment shall not exceed the requirements established in NEMA MG 1 Chapter 12. Temperature rise testing shall be started when all parts of equipment are within the temperature required by NEMA at the time of starting the tests.

3.5.6 Insulation-Resistance Testing

Insulation-resistance testing shall be performed to ensure that the complete elevator wiring systems will be free from short circuits and grounds. Electrical conductors shall have an insulation-resistance of not less than one megohm between each conductor and ground, and not less than one megohm between each conductor and all other conductors. Prior to testing, provisions shall be made to prevent damage to electronic devices.

3.6 FRAMED INSTRUCTIONS

Two sets of instructions shall be typed and framed under glass or in laminated plastic, and posted side-by-side in the elevator room where

directed, before acceptance of elevator systems. First set of instructions shall include wiring and control diagrams showing the complete layout of elevator system. Second set of instruction shall include the condensed operating instructions explaining preventive maintenance procedures, the methods for checking the elevator system for normal safe operation, and the procedures for safely starting and stopping the elevator system.

3.7 OPERATOR TRAINING

Contractor shall conduct a formal training course for operating Government personnel which shall include care, lubrication, adjustment and maintenance of the elevator equipment. Training period of the elevator equipment. Training period shall consist of a total of four hours of normal working time and shall start after the system is functionally completed but prior to final acceptance tests. Field instructions shall cover all of the items contained in the operating and maintenance instructions, including demonstrations of routine maintenance operations. The Contracting Officer shall be notified at least 14 days prior to date of starting the training course.

-- End of Section --